MULTI STATE EVALUATION OF DUAL ELIGIBLES DEMONSTRATION

MINNESOTA SENIOR HEALTH OPTIONS EVALUATION
FOCUSING ON UTILIZATION, COST, AND QUALITY OF CARE

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FINAL

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EXECUTIVE SUMMARY

In 1997 the University of Minnesota was awarded a contract from the Centers for Medicare and Medicaid Services (CMS) to evaluate several state demonstration programs designed to create alternative delivery services for the dually eligible-people who are eligible for both Medicare and Medicaid. This report analyzes the utilization of services, costs, and quality for one of those demonstration projects, Minnesota Senior Health Options. Encounter and fee-for-service claims data for both the MSHO enrollees and control groups have been analyzed to determine if the outcomes of care, including inpatient hospitalization, emergency room visits, and preventable hospitalizations, are different for MSHO compared to control groups. The cost to the government for the provision of services measured through MSHO capitation payments is compared to fee-for-service Medicare payments for the control groups. Quality of care is measured in terms of preventable hospitalizations, delay in nursing home admission, mortality, and quality indicators for nursing home residents.

The dual eligible demonstrations are designed to combine Medicare and Medicaid funding for dual eligible populations in order to improve coordination and remove redundancies. Ideally, from a public policy perspective, such a merger should improve efficiency and permit more service (and results) for the same expenditures, or reduce the overall expenditure. Placing such combined programs under the umbrella of managed care is a step designed to control costs and permit more flexible use of funds. However, it is not clear if changing the nature of the funding by combining Medicare and Medicaid, or adding an overlay of care coordination, is sufficient to achieve improvements in care and savings in costs. The demonstration projects being examined offer an opportunity to learn 1) whether such changes can be achieved and 2) what factors are associated with their successful implementation.

Background

MSHO combines Medicare and Medicaid financing and benefits in a managed care delivery system that includes acute and long-term care services. Those seniors who are dually eligible for Medicaid and Medicare, who are 65 years of age and older, and who reside in one of 10 Minnesota counties (seven metro and three rural) are eligible to enroll in MSHO. (Medicaid only individuals could enroll in MSHO beginning January 2002). Enrollment into MSHO is voluntary. MSHO is offered as an option to the State's mandatory Medicaid capitated managed care program, Prepaid Medical Assistance Program (PMAP), which operates in 70 of the State's 87 counties. Enrollees may reside in the community or in residential institutions such as nursing homes or ICF-MR facilities. All levels of need or frailty are eligible, ranging from healthy to including hospice and end stage renal disease patients. MSHO benefits include all Medicaid and Medicare services including home and community based "waiver" services and 180 days of nursing home care for community enrollees. Nursing home care is paid fee for service for enrollees who stay in a nursing home beyond 180 days or who were already in nursing home when they enrolled in MSHO. Each MSHO enrollee is assigned a care coordinator. Care coordinators may work for one of the three participating non-profit health plans, a care system (organized affiliations of clinics, hospitals, and long-term care providers that may coordinate all or most services for

enrollees), clinic, or county depending upon the particular care model used by the health plan. Medicare and Medicaid payments are capitated based upon level of care need of the enrollee. For MSHO enrollees who meet nursing home criteria but live in the community, health plans receive a risk adjustment to the regular Medicare managed care payments. Payments for other enrollees – people in nursing homes and the community non-frail – are the same as for other Medicare + Choice plans.

The goals of MSHO (as stated in MSHO's original Operational Protocol and subsequent reports to CMS) are to:

1. Align fiscal incentives to support clinical practices and reduce cost shifting between acute and long-term care services and Medicare and Medicaid
2. Reorganize service delivery systems to reduce administrative duplication and provide a seamless point of access for enrollees
3. Create a single point of accountability for tracking total costs and outcomes of care across a full range of acute and long-term care services

In addition to these goals, the potential impact of MSHO or clinical expectations of the demonstration, as first listed in the Operational Protocol written in 1996, include:

- Rates of hospitalization for nursing home residents, hospice patients, and ambulatory dually eligibles are expected to drop, as are hospitalizations for people with chronic illnesses that are receiving Home and Community Based Services (HCBS). The average length of a hospital stay is also expected to decrease.
- Rates of admission for long-term stays to nursing homes, from both hospitals and homes, are expected to decline. Rates of admission for short-term stays are expected to increase.
- Rates of discharges to HCBS from hospitals and nursing homes are expected to increase.
- Utilization of community services, including physician visits, nurse practitioners, assisted living arrangements, social services, and in home services, is expected to increase. The types of services provided may not link to screening scores in the same pattern as they have in the past.
- Emergency room visits may decrease for nursing home residents as well as enrollees who are community-based. There may be a substitution of other ambulatory services.
- Utilization of some types of ambulatory services, such as office visits and outpatient surgeries, may increase.
- Rates of preventive health services being provided are expected to increase. Clinical outcomes associated with those preventive efforts are expected to improve (e.g. flu vaccinations will reduce hospitalization and clinic visits for the flu).
- Reduced administrative costs are expected by eliminating the need for duplicate billing, coordination of coinsurance, and deductibles, but those may be offset by an increase in audits, quality measurement, and care coordination expenses.
- Enrollees' overall level of satisfaction with their care is expected to equal or surpass non-MSHO enrollees' satisfaction.
- Reduced incidence rates of polypharmacy.

Evaluation Methodology

The Minnesota dual eligible demonstration is based upon voluntary enrollment and therefore does not use an experimental design; all elderly dual eligible beneficiaries in the designated counties have the option of enrolling in the demonstration program. Because the demonstration does not establish a control group, the evaluation must use a quasi-experimental design and construct a comparison group. Therefore, the study design used in this evaluation includes an experimental group (MSHO enrollees) and a combination of two control groups consisting of dually eligible individuals in order to ensure comparability and resolve the issue of selection bias. By comparing the MSHO enrollees to a group that was comparable but did not have the option to enroll (they were outside the enrollment area), we can control for the effect of selection. Using a group that is exposed to the same group of providers, but chose not to enroll in MSHO (the in-area control group), we can examine the effect of enrollment. Both control groups include individuals enrolled in the Prepaid Medical Assistance Program (PMAP) and in Medicare. Parallel efforts were conducted with nursing home residents and community-dwelling enrollees.

Enrollment information was provided by person on a monthly basis, consistent with enrollment and disenrollment policies for MSHO. Based upon enrollment information provided from these files, individuals were identified as living in the community or a skilled nursing facility, and further separated into experimental, Control-In or Control-Out groups based on their enrollment status and area of residence on a monthly basis. This process yielded a final working sample of 28,297 dually eligible persons or 638,227 person months.

Specific service definitions were created for each type of service to accommodate the data elements from the various sources (Medicare claims data, State of Minnesota Department of Human Services encounter data, state quality assurance review records, and Minimum Data Set files from CMS).

To compare costs of MSHO with those of the controls we used actual Medicare and Medicaid capitation payments paid to health plans for MSHO and PMAP enrollees on a monthly basis. In addition, for PMAP enrollees we captured all paid reimbursements for Medicare services. The cost of an inpatient stay that spans more than one month was attributed to the month of admission. The cost of a nursing home stay was distributed based upon taking the total cost for a stay divided by days in the stay multiplied by the days in the month of analysis. We included the Elderly Waiver payments for controls and added the nursing home payments for all groups where appropriate.

We used MDS data to examine quality indicators for nursing homes in MSHO and the two control groups. MDS records were available between June 1998 and December 2000. We selected all quarterly and annual records from the MDS and excluded the admission records (Quality Indicators [QIs] should not be affected by nursing home quality at admission) and discharge records (no QI variables are available).

Analysis of utilization was conducted using two distinctly different approaches: 1) a cross sectional longitudinal analysis and 2) a matched cohort longitudinal analysis. Each method answers questions from a slightly different perspective. The cross sectional approach involved calculating the utilization for each month, creating in effect a new sample each time. Thus a person could be in PMAP one month and enroll in MSHO the next. This approach yields a series of cross-sectional analyses, which are then aggregated to create an average monthly rate. Adjustment for repeated measures of the same people at different time points is implemented by using generalized estimating equations. The cross sectional approach uses the full sample available and produces the results that are generalizable to the entire population. The cross sectional analysis emphasizes the general effect of MSHO as a program. Results focus on the change in MSHO as a program over time with subgroup analyses completed to determine the effect of different duration of enrollment in MSHO. Questions of selection bias are addressed through statistical adjustments for patient characteristics.

The matched cohort design is a more traditional approach that involves selecting a comparison sample that is similar to the experimental group, in this case MSHO. The cohort analysis emphasizes the effect of MSHO enrollment on an individual level, aggregated across the cohort. Because the enrollment into MSHO (and into PMAP) is continuous (i.e., people continue to enroll during the course of the study), there is no clear starting point for the demonstration; therefore the experimental cohort is a moving cohort. A person was classified as a member of the experimental group if he/she participated in the MSHO program at some point in time. Based upon the quasi-experimental design there is a fixed limited control population that is not initially matched to the experimental group. The control population consisted of people who had never been enrolled in MSHO and did not change their allocation (in-area and out-of-area) over time. Control people were matched based on pair-wise selection with replacement. It allows every control person to serve as a match for different study people at different time moments and to participate in the corresponding control cohort more then once. A virtual MSHO enrollment date was assigned to controls based on (but may not be equal to) the enrollment date of the matched study person. The overall sample was smaller using the cohort method as compared to the cross sectional method.

In both methods variables used to match groups or as risk adjustors included gender, race (white/non-white), age, original reason for enrollment in Medicare (elderly/disabled), duration of dual eligibility, prior health care utilization, and an indicator of frailty that was based for community populations on participation in the Elderly Waiver program for controls and using the rate cell ("B") for study persons and for nursing home enrollees, the duration of nursing home stay and Morris MDS score. The statistical significance of the difference between MSHO and each of the two control groups was calculated by using regressions that adjusted for various factors. The results of the statistical analyses are presented in tables showing the raw data with no adjustment, and 2) adjusting for demographic variables (deciles of age, white/non white, and gender, original reason for enrollment in Medicare (elderly/disabled), duration of dual eligibility, an indicator of frailty that for community enrollees was based on participation in the Elderly Waiver program for controls and using the rate cell ("B"), which designated people who were deemed nursing home certifiable, for

study persons, and for nursing home enrollees was based on the duration of nursing home stay), as well as prior utilization.

Summary of Results
Descriptive Data
        In many respects, the MSHO population is very similar to the PMAP population in the two control groups.

- MSHO enrollees are predominately female as is the case in the Control-In and Control-Out groups.
- Women enrollees are slightly older than men.
- Control-In women and men are slightly younger than MSHO or Control-Out enrollees.
- The majority of MSHO enrollees live in nursing homes. The number of MSHO enrollees living in nursing homes as a percentage of total enrollees is higher than for either in-area or out-of-area control groups.
- Of those individuals living in the community, the majority of them (78% of MSHO community enrollees in January 1999) were considered well or non-nursing home certifiable as measured by the rate cell category assigned to them. In January 1999, 12.39% of the community enrollees in our PMAP Control-In group were enrolled in the Elderly Waiver program and 30.90% of the Control-Out group.

Utilization Analysis
        The following list provides a summary of the results from this evaluation. Only the statistically significant findings are highlighted here. In general we did not find a significant difference in utilization of services in the community population. We did see a fairly consistent and significant difference (across services and in the same direction) in utilization for nursing home enrollees.

Community
- No difference in hospital admissions after adjustments
- Inpatient hospital length of stay is longer for Control-Out group with and without adjustment and longer for the Control-In group with adjustment
- MSHO enrollees have fewer preventable emergency visits than Control-In group
- MSHO enrollees have fewer number of face-to-face provider visits
- Generally the pattern of utilization when analyzing only the frail community enrollees is comparable to the larger study
- There is a greater effect on preventable emergency room visits and preventable hospitalizations compared to control groups with increased duration in MSHO. There was no effect of duration of exposure to MSHO on utilization of other services.
- MSHO enrollees more likely to receive preventive services (immunizations and most Medicare covered screening tests) Pattern is stronger compared to Control-In group

- MSHO enrollees receive more therapy services and generally fewer lab and x-ray services
- MSHO enrollees generally received fewer mental health services
- MSHO enrollees receive more home health nursing visits and special transportation but fewer other community based services such as semi residential care, out-of-home care, lower level assistance in home, respite care, and case management

Nursing Homes
- MSHO enrollees had fewer hospital admissions than Control-In enrollees
- MSHO enrollees had fewer hospital days than Control-In enrollees
- MSHO enrollees had fewer preventable hospital admissions than Control-In enrollees
- MSHO enrollees had fewer emergency room visits and preventable emergency room visits than either control group
- MSHO enrollees had fewer face-to-face provider visits than either control group
- There was no effect on utilization with increased duration or exposure to MSHO – similar results were found at less than 30 days as well as greater than one year
- MSHO enrollees were more likely to receive influenza immunization and some screening tests than either control group
- MSHO enrollees received fewer therapy services as well as lab and x-ray services

Cost Analysis
- MSHO capitation rates were significantly higher than fee-for-services payments for the Control-In group for both the community and nursing home population
- MSHO capitation rates for frail community enrollees, indicated by Rate Cell B, were significantly higher than fee-for-services payments for Control-In enrollees only in 2000.

Quality Analysis
- There was no difference in death rates overall for either community or nursing home groups
- MSHO had significantly fewer short stay (30 days or less) nursing home admissions than either control group
- There was no difference between groups in rates of nursing home discharge (successful discharge in that the individual was alive upon discharge and for up to one month following discharge) for nursing home stays less than 30 days. MSHO had significantly greater rates of discharge at less than 60 days compared to both groups. MSHO had a significantly lower rate of discharge from nursing homes greater than 60 days
- Quality Indicators for nursing home residents were comparable for MSHO and the two control groups

Discussion

In general, the results of this evaluation are mixed. Some expectations of the MSHO demonstration have been realized and some have not. The effect of MSHO is stronger for nursing home enrollees as compared to community enrollees. The results suggest that MSHO is having some impact on the process of care, providing more of some types of preventive and community care services for community residents (although the number of face-to-face provider visits is significantly less than either control group). There is no consistent measurable effect, however, on the various outcomes or indicators of quality care measured in this study for community residents. There was indication, however, that the rate of preventable emergency room use is lower for MSHO enrollees compared to the Control-In group. The pattern of results is the same when considering only the frail community elderly, a group targeted by MSHO for greater emphasis and a group for which MSHO receives a larger Medicare capitation payment.

MSHO nursing home enrollees have significantly fewer hospitalizations, emergency room services and preventable emergency services than either control group. Hospital days and preventable hospital admissions are also significantly lower for MSHO nursing home enrollees compared to the Control-In group. The reduced number of hospital days appears to be as a result of fewer admissions, not shorter lengths of stay. At the same time MSHO enrollees receive some more screening test but fewer physical therapy services, lab and x-ray services and face-to-face provider visits. The effect of MSHO on hospital admissions and emergency room services may reflect the extensive use of a nurse practitioner model for primary care. Results found in this evaluation are consistent with other studies examining the use of nurse practitioners in nursing homes. It is impossible to determine the impact of other MSHO components such as combining Medicare and Medicaid benefits on the utilization of services by nursing home enrollees.

There is a greater effect on preventable emergency room visits and preventable hospitalizations with increased exposure to MSHO for community residents. There was no change in patterns of utilization with increased exposure to MSHO for nursing home residents.

In terms of quality of care, MSHO again has a mixed impact. There is no difference in the overall death rates compared to control groups for either community or nursing home residents. Contrary to expectations, MSHO has fewer short stay nursing home admissions, the same rate of longer-term nursing home admissions, a greater rate of discharge of admissions between 30 and 60 days, but lower rates of discharge for nursing home admissions greater than 60 days. Quality Indicators in nursing homes are comparable but not better than for control groups. Strong reductions in preventable hospital admission and emergency services may be part of a larger trend in overall hospital use. It is difficult to determine if the evaluation is measuring an overall phenomenon versus a specific phenomenon (i.e. cutting back on overall utilization of services in MSHO).

The cost to the government, both state and federal, is higher under MSHO compared to fee-for-service Medicare and a combination of capitated Medicaid and fee-for-service Medicaid payments. It is important to note that MSHO Medicare capitation payments are

based upon a rate structure approved by CMS using the established M+C payment rates. For Medicare cost comparisons, only the frail nursing home certifiable population (rate cell B) resulted in added per capita payments to MSHO plans. For this subgroup of the community residents, MSHO Medicare costs were higher only in the last year included in this analysis. For all other populations, including those in the nursing home, MSHO plans received the same amount as they would have absent the demonstration. A portion of the difference in Medicare costs between MSHO enrollees and Control-In group beneficiaries in the Medicare fee-for-service program is attributable to payment policy changes enacted in the Balance Budget Act of 1997. This legislation broke the link between local Medicare fee-for-service costs and capitation payments to managed care plans.(Medicare Payment Advisory Commission, 2001).

During the course of this analysis, CMS received many helpful comments from MSHO program staff. Many of these comments provided background on the demonstration and context for the evaluation and were incorporated into this report. Two specific comments about the cost analysis methodology were not incorporated. First, the State disagrees with the accounting of MSHO enrollee status (movement from community to nursing home), offsets for patient spend-down contributions and the exclusion of a high-cost population from the control group for the Medicaid cost analysis. The report includes a discussion of the nursing home liability paid by MSHO plans and its interaction with the patient spend-down liability. The report further acknowledges that the patient spend-down liability could not be excluded from the Medicaid capitation payments using the data available for this evaluation. While this results in an overstatement of the cost of the MSHO program, it is estimated that only one percent of the MSHO community members were impacted by spend-down requirements. Secondly, the State disagrees with the use of Medicare fee-for-service costs as the basis of the comparison for the control group for the Medicare cost analysis. The report acknowledges that MSHO Medicare capitation payments are based on M+C rates and that M+C rates in Minnesota are considerably higher than average fee-for-service costs. However, since the control group is enrolled in traditional Medicare, fee-for-service costs are the appropriate comparison.

INTRODUCTION

In 1997 the University of Minnesota was awarded a contract from the Centers for Medicare and Medicaid Services (CMS) to evaluate four state demonstration programs designed to create alternative delivery services for the dually eligible-people who are eligible for both Medicare and Medicaid. The demonstrations were to be conducted in four states: Minnesota (Minnesota Senior Health Options), Wisconsin (Wisconsin Partnership Program), Colorado (Colorado Integrated Care and Financing Project), and Rochester, New York (Monroe County Continuing Care Network). Subsequent to 1997 the Colorado participants decided that they were no longer interested in taking part in the demonstration so that component of the project was cancelled. The New York site has not yet become operational and is no longer part of the evaluation contract. While the two operational demonstrations in Minnesota and Wisconsin are pursuing different options or approaches for designing and operating integrated care, they share a common goal to provide acute and long-term care services to dually eligible elderly and disabled persons which provide increased coordination, improve access to quality services, and control or more appropriately allocate future costs.

The Department of Health and Human Services has been encouraging efforts to better coordinate services provided to individuals eligible for both Medicare and Medicaid. These individuals are often frail elderly Medicare beneficiaries who have high medical costs and have spent down their income and assets to become Medicaid eligible, or they are low-income elderly who have aged into the Medicare program, but are not necessarily frail. Nationally, approximately 17% of individuals enrolled in Medicare were also covered by the Medicaid program, and represented 28% of total Medicare expenditures during 1997. Dual eligibles represent approximately 19% of the Medicaid population, and account for 35% of Medicaid expenditures (Clark & Hulbert, 1998). While these two programs potentially provide a comprehensive package of benefits, some observers note a lack of coordination in benefits and resultant fragmented care, which is both wasteful and inefficient. Medicare and Medicaid have different payment rules, provider qualifications, offer different benefit packages, and have little incentive for integration.

The dual eligible demonstrations are designed to combine Medicare and Medicaid funding for dual eligible populations in order to improve coordination and remove redundancies. Ideally, from a public policy perspective, such a merger should improve efficiency and permit more service (and results) for the same expenditures, or reduce the overall expenditure. Placing such combined programs under the umbrella of managed care is a step designed to control costs and permit more flexible use of funds. However, it is not clear if changing the nature of the funding, or adding an overlay of care coordination, is sufficient to achieve improvements in care and savings in costs. The demonstration projects being examined offer an opportunity to learn 1) whether such changes can be achieved and 2) what factors are associated with their successful implementation.

Experience to date with actual integration of Medicare and Medicaid funding is limited. Perhaps the most extensively integrated program is PACE (Program for All-inclusive Care of the Elderly) approach, which uses a staff model of medical care built around day care. The PACE approach emphasizes teamwork with broad participation in regular care conferences by employees at all levels. PACE physicians are specifically hired by the programs and are the exclusive providers of primary care (Kane et al., 1992) (Eng et al., 1997) (Kane, 1999) (Chatterji et al., 1998). Although the Social HMO model includes a modest amount of long-term care, it uses exclusively Medicare funds (Kane et al., 1997). Few of these SHMOs have contracted directly with Medicaid to offer a wide range of integrated benefits. Likewise, the Arizona Long-term Care Services (ALTCS) program provides capitated Medicaid services through a limited range of plans which also provide fee-for-service funded Medicare coverage (McCall, 1997).

The evaluation in Minnesota and Wisconsin is largely a quantitative outcome evaluation of the effectiveness and costs of these new programs. The basic design was intended to compare the populations served by the demonstration program with suitable controls. A variety of issues were to be explored, including disability, satisfaction, care burden, and various utilization parameters. This material was to be supplemented by case studies designed to expand on the quantitative data and to trace the evolution of the projects. The evaluation design does not directly address the issue of whether the demonstration achieved its operational goals.

Although the two programs differ in some fundamental respects (e.g., MSHO addresses all older dual eligible persons whereas WPP is targeted at those who are deemed to be eligible for nursing home care but are living in the community), the basic evaluation plans for the programs in Minnesota and Wisconsin are parallel. The design includes a survey of enrollees and two matched control groups: one selected from the same geographic areas where the plans operate (i.e., composed of persons who were eligible but declined to participate) and a second from comparable locations in the state where the plan is not offered (to minimize the effects of selection bias). The survey compares the general levels of health and disability (along with unmet need) as well as the satisfaction of both enrollees and their families and the care burdens of the latter. In the case of MSHO, a second survey was done of community enrollees to look for change in status and data from a statewide nursing home case mix data set was used to measure change in functional status over time for nursing home residents. Annual case studies were done through site visits. The initial visits provided insights into the workings of the programs. Subsequent visits were used to update progress and to focus on specific aspects of the programs. Complete results of the survey of enrollees and the site visits have been reported previously.

A major component of the evaluation plan is an analysis of utilization, cost, and quality of care data from both the enrollees and controls. Results from this analysis are the focus of this report. Encounter and fee-for-service claims data have been analyzed to determine if the outcomes of care, including inpatient hospitalization, emergency room visits, and preventable hospitalizations, are different for MSHO compared to matched control groups. The cost to the government for the provision of services measured

through MSHO capitation payments will be compared to fee-for-service Medicare payments for the control groups. Quality of care will be measured in terms of preventable hospitalizations, delay in nursing home admission, and quality indicators for nursing home residents. Background information for this report has been gathered from previous University of Minnesota site visit reports, MSHO member materials including marketing materials, MSHO Waiver Report for 1997 – 1999, MSHO Annual Report 1999, MSHO Annual Report 2000, MSHO Waiver Extension Report, MSHO Operational Protocol, 2002 MSHO Model Contract, 2001 Model PMAP/PGAMCE/MinnesotaCare Model Contract, as well as other information available on the MSHO web site http://www.dhs.state.mn.us/HlthCare/MSHO-MNDHO/research/default.htm and provided by MSHO staff.

BACKGROUND

The State of Minnesota received CMS (then HCFA) approval in April 1995 and began enrolling members in February 1997 into the Minnesota Senior Health Options (MSHO) demonstration. MSHO integrates Medicare and Medicaid financing for dually eligible seniors into a market-based managed care delivery system offering both acute and long term care services. Enrollment into MSHO is completely voluntary. Enrollment is available to dually eligible seniors living in the seven-county metropolitan area and in three rural counties in Minnesota. MSHO enrolls individuals living in the community or living in nursing homes.

MSHO was developed in a state that has been a forerunner in innovative long-term care demonstrations, particularly those with a managed care component. It was a site for one of the four original Social Health Maintenance Organizations (S/HMOs), a partnership between a large HMO, and a Long-Term Care Organization. Minnesota is also the place where the Evercare program, which now operates in several states, originated. In 1983, the state of Minnesota began its involvement in Medicaid managed care with its Prepaid Medical Assistance Program (PMAP). PMAP providers offer primary care and acute care services to certain Medicaid-eligible residents in the counties where PMAP is implemented.

The MSHO demonstration operates under the authority of Section 402 of the Social Security Act for Medicare and Medicaid 1915(a) and 1915 (c) waivers from CMS (MSHO originally began operation under Medicaid 1115 waivers and converted to 1915 in May 2000). The Federal waiver was renewed in 2001 and is approved through 2004. These waivers permit MSHO to combine the purchase of Medicare and Medicaid services into one contract managed by the State of Minnesota as well as to contract with managed care organizations that are not currently Medicare + Choice providers. The waivers also permit MSHO to offer a Medicare rate cell capitation payment for frail elderly living in the community. The single contract arrangement with managed care organizations merges Medicare and Medicaid managed care requirements including enrollment processes, marketing and member materials, and grievance procedures, all reviewed and pre approved by CMS and the State. Participating managed care organizations receive the Medicare capitation payment directly from CMS and the Medicaid capitation payment from the State of Minnesota. While participating managed care plans do not need to participate in Medicare + Choice, they do need to be a State PMAP provider.

The goals of MSHO (as stated in MSHO's original Operational Protocol and subsequent reports to CMS) are to:

1. Align fiscal incentives to support clinical practices and reduce cost shifting between acute and long-term care services and Medicare and Medicaid
2. Reorganize service delivery systems to reduce administrative duplication and provide a seamless point of access for enrollees

3. Create a single point of accountability for tracking total costs and outcomes of care across a full range of acute and long-term care services

In addition to these goals the potential impact of MSHO or clinical expectations of the demonstration, as first listed in the Operational Protocol written in 1996, include:

- Rates of hospitalization for nursing home residents, hospice patients, and ambulatory dually eligibles are expected to drop, as are hospitalizations for people with chronic illnesses that are receiving Home and Community Based Services (HCBS). The average length of a hospital stay is also expected to decrease.
- Rates of admission for long-term stays to nursing homes, from both hospitals and homes, are expected to decline. Rates of admission for short-term stays are expected to increase.
- Rates of discharges to HCBS from hospitals* and nursing homes are expected to increase.
- Utilization of community services, including physician visits, nurse practitioners, assisted living arrangements, social services, and in home services, is expected to increase. The types of services provided may not link to screening scores in the same pattern as they have in the past.
- Emergency room visits may decrease for nursing home residents as well as enrollees who are community-based. There may be a substitution of other ambulatory services.
- Utilization of some types of ambulatory services, such as office visits and outpatient surgeries, may increase.
- Rates of preventive health services being provided are expected to increase. Clinical outcomes associated with those preventive efforts are expected to improve (e.g. flu vaccinations will reduce hospitalization and clinic visits for the flu).
- Reduced administrative costs are expected by eliminating the need for duplicate billing, coordination of coinsurance, and deductibles, but those may be offset by an increase in audits, quality measurement, and care coordination expenses.
- Enrollees' overall level of satisfaction with their care is expected to equal or surpass non-MSHO enrollees' satisfaction.
- Reduced incidence rates of polypharmacy.

* this is likely to be an irrelevant contradiction with the first expectation.

Eligibility
Those seniors who are dually eligible for Medicaid and Medicare, who are 65 years of age and older, and who reside in one of 10 Minnesota counties are eligible to enroll in MSHO. Enrollment into MSHO is voluntary. Beginning January 2002 as a condition of the demonstration renewal, MSHO also enrolls seniors who are eligible only for Medicaid. Enrollees may reside in the community or in residential institutions such as nursing homes or ICF-MR facilities. All levels of need or frailty are eligible, ranging from healthy to including hospice and end stage renal disease patients. Income eligibility requirements for MSHO are the same as for PMAP. A slightly higher income

requirement is applied for individuals eligible for the Elderly Waiver program under the 1915(c) waiver. Medically needy MSHO enrollees with monthly income spend downs may enroll in MSHO and pay the monthly spend down amount to the State similar to a monthly premium.

Service Delivery Areas

MSHO was originally approved to offer services to seniors living in the seven-county metropolitan area including the counties of Anoka, Carver, Dakota, Hennepin, Ramsey, Scott, and Washington. MSHO expanded its service area to three out-state rural counties (Mille Lacs, Sherburne, and Wright) in 2001. The service delivery area covered by the three participating health plans started small and has grown over time. Enrollment began in two counties in February 1997 (Ramsey and Hennepin) and expanded to Anoka and Dakota in September 1997. MSHO was offered in Scott County in 1999, Washington County in 2000, and Carver County in 2001. Not all health plans operate in all counties.

Delivery Systems

All HMOs in Minnesota are required to be nonprofit. The State of Minnesota has contracted with three nonprofit managed care organizations to participate in MSHO (UCare, Medica, and Metropolitan Health Plan (MHP)). These health plans are required to provide integrated Medicare and Medicaid services including primary, acute, and long term care services to MSHO enrollees. These health plans area required to be PMAP providers. There is no requirement that the health plan be a Medicare + Choice provider (only one of the plans currently offers a Medicare + Choice product). All health plans participate in MSHO on a risk basis. Table 1 describes the structure, scope, and location of the three health plans.

Table 1
Description of Three MSHO Health Plans

Feature	Medica	UCare	Metroplitan Health Plan
Care Systems	– EverCare – Fairview Partners – Access Alliance – Park Nicollet	– HealthEast – EverCare – University Affiliated Family Physicians & Other Clinics – Fairview Partners	– Hennepin County Community Services
Counties	Hennepin, Ramsey, Anoka, Dakota, and Scott (Scott added in June 1999)	Hennepin, Ramsey, Anoka, Dakota; expanded into Washington County in May 2000; expanded into Mille Lacs, Sherburne, Wright, and Carver in 2001	Hennepin
Scope	20 hospitals, 79 clinics, 532 physicians, 115 nursing homes	10 hospitals, 48 clinics, 89 nursing homes	1 hospital, 28 clinics, 348 physicians (some in residency training), 28 nursing homes
Start date	October 1997	March 1997	March 1997

Each health plan must provide a full range of services including care coordination. The clinic models used vary by health plan. MSHO health plans may contract with care systems and/or clinics to provide primary care and care coordination. Care systems may sub contract with clinics for primary care services as well as other providers for acute and long-term care services. Care systems are sponsored by a variety of provider organizations from long-term care providers in partnership with hospital systems or clinics or hospital and physician systems. Upon enrollment the enrollee chooses a primary care clinic or a care system based upon the health plan model, usually determined by where their existing primary care physician is located.

Within the structure of managed care organizations (MCOs) and care systems, MSHO wanted to permit flexibility and as a result has three distinct models for its three health plans. There is no single structure of health plans and care systems although all use an Independent Practice Arrangement (IPA) primary care model with care coordination provided either through nurse practitioners (NPs) for nursing home residents and registered nurses or social workers for community members. Three quite different systems exist that together exhibit a continuum of management styles. Medica is the more traditional MCO prototype whereby a Health Plan provides some administrative services and passes through the remainder of the funds to three Care Systems that provide primary care and care coordination. UCare is a mixed model with some subcapitation. UCare contracts with both care systems and clinics that provide both primary care and care coordination. MHP, in contrast to both, more closely resembles a single source county provider, though some subcontracting occurs. MHP contracts with a variety of clinics for primary care. Care coordination for MHP enrollees is provided either by MHP staff or by Hennepin County Community Health Services. NPs working with physicians serve nursing home residents.

Health plans may develop their own network of home and community service providers or contract with counties to provide services including accessing an existing network of home and community vendors, and providing preadmission screening and case management functions. Health plans and care systems may subcontract with nursing home providers or pay the State determined per diem calculated based upon case mix rate. The MSHO network of providers offered by the three health plans is similar to but somewhat smaller than those for PMAP but includes most hospitals and major clinic systems in the metropolitan area. The contractual arrangements between health plans and care systems vary in structure and risk sharing arrangements. Some care systems receive a sub capitation from the health plans and bear risk for services provided. Other care systems share the risk with the health plans. Figure 1 describes the care system in greater detail.

Figure 1

CARE COORDINATION BY MSHO PLAN
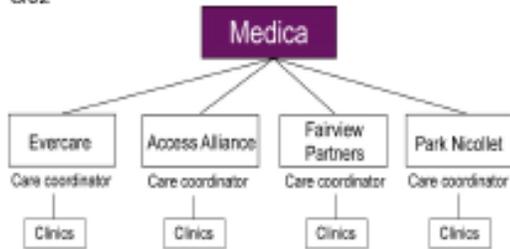
Primary Care:
- Medica contracts with 3 care systems that provide both primary care and care coordination. The care systems sub-contract with clinics for primary care but may also directly provide some primary care such as Geriatric Nurse Practitioners (GNPs).
- Each enrollee chooses a care system for all care. Enrollees often choose the care system based on which physicians or clinics are associated with that care system.
- Nursing home residents in each care system receive primary care from a GNP who works closely with the physician.

Care Coordination:
- Care coordinators (RNs and Social Workers) are employed by the care systems.
- The care system assigns a care coordinator who works closely with the clinic with which the enrollee's physician is associated.
- Care coordinators for nursing home enrollees act as a resource to the GNP and physician.

PAS: Conducted by care system care coordinators.

HCBS: HCBS are authorized by the care coordinator and any licensed or certified vendor may be accessed.

* PAS = Preadmission screening
* HCBS = Home and Community Based Services

Primary Care:
- MHP contracts with a variety of clinics for primary care including Hennepin County Medical Center, Hennepin Faculty Associates, Aspen Medical Group and many community clinics.
- Enrollees choose a primary care clinic and care coordinators work closely with that clinic. Nursing home residents in some of the clinics may receive primary care through a GNP.

Care Coordination:
- Care coordination for nursing home and low risk non-nursing home certifiable (NHC) enrollees is provided by care coordinators employed by MHP.
- MHP contracts with Hennepin County Community Health Services for care coordination for high risk NHC enrollees.

PAS: Conducted by Hennepin County Community Health Services.

HCBS: HCBS are provided through arrangements with Hennepin County Community Health Services.
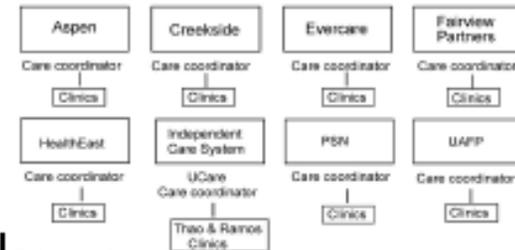
Primary Care:
- UCare contracts with both care systems and clinics that coordinate care. Enrollees choose a clinic or care system for primary care and care coordination.
- Care systems differ from clinics only in that they are broader networks that may include other providers such as nursing homes and may subcontract with clinics for primary care. Clinics usually rely on UCare's general network for other services.
- Nursing home residents who choose a care system usually get primary care through a GNP.

Care Coordination:
- Each clinic or care system employs their own care coordinators. However UCare employs care coordinators directly for the Independent Care System.
- UCare also specially contracts with some counties for ongoing joint care coordination in certain circumstances.

PAS: UCare contracts with Hennepin, Anoka and Washington counties where PAS is often done jointly with the care system or clinic care coordinators. PAS in other counties is conducted by the care system or clinic care coordinator.

HCBS: UCare contracts with Hennepin County for all HCBS. For other counties UCare contracts directly with individual providers or makes arrangements to access the county HCBS network.

Source: http://www.dhs.state.mn.us/HlthCare/MSHO-MNDHO/care-coordination.pdf

MSHO attracted Health Plans and Care Systems whose initial strength was in nursing home management. One such model of managed care for nursing home residents is the Evercare program, a subsidiary of United Healthcare, a proprietary corporation. In Minnesota, Evercare functions as a primary care system and as a subcontractor to health plans. Minnesota Evercare is not part of the national Evercare demonstration. Nationally, the Evercare program operates as a Medicare+Choice capitated program of nursing home primary care. The national Evercare model works exclusively as a risk-based HMO contracting with Medicare. Evercare as a care system under MSHO combines Medicare and Medicaid funds in serving nursing home residents and others living in the community. (Because Minnesota law prohibits proprietary HMOs, Evercare cannot operate as a direct health plan in this state; it must act as a subcontractor to an authorized plan.) Since the beginning of MSHO several other care systems have developed that utilize similar care models to Evercare in serving nursing home residents.

The corollary to MSHO's initial strength in nursing homes is that it did not begin with a strong base in management of home and community services. The community care component of MSHO has been steadily developing and has required MSHO care systems and providers such as Evercare to develop new networks and skills and adapt their clinical models to include community residents.

Health plans provide a primary administrative role in MSHO. Health plan administrative functions include:

- developing and maintaining provider networks and contracts
- submitting Health Employer Data Information Set (HEDIS), encounter and enrollment data to the State and CMS
- implementing quality improvement projects
- providing member services, member materials, marketing, and client education
- claims processing
- conducting utilization review and prior authorization of some services
- providing fiscal solvency guarantees to the State of Minnesota

Relationship to PMAP

Each MSHO health plan is required to be a PMAP (Prepaid Medical Assistance Program) provider. PMAP, a mandatory prepaid capitated program for Medical Assistance participants, has been operating in Minnesota since 1985. PMAP is a mandatory program operating in 70 of Minnesota's 87 counties. PMAP covers approximately 170,000 low-income and medically needy children, adults, families, and seniors. PMAP health plans are required to provide all Medicaid covered services except long-term care services (beginning in 2002 under conditions of the 1115 waiver authority PMAP began covering the first 90 days of a nursing home stay for those enrollees moving from the community in January 2001). Medicaid covered services include Medicare deductibles and co-insurance, physician visits, medical supplies, dental, hospitalizations, therapies, prescription drugs, eyeglasses, hearing aides, medical transportation, home care services, and translator services. For dually eligible enrollees Medicare pays providers directly for Medicare covered services. PMAP does not include

home and community based services but is responsible for all State plan home care services which includes coverage of home health aides, personal care and private duty nursing services. PMAP enrollees may receive these services through the state's 1915(c) waiver for the elderly, which are paid on a fee-for-service basis. Seniors enrolled in PMAP and who are dually eligible may voluntarily choose to enroll in a Medicare + Choice plan. Many of the MSHO administrative operations such as rate setting, information systems, encounter data collection and enrollee materials are integrated with PMAP.

Benefits
MSHO Services

MSHO includes all Medicare covered services, all Medicaid covered services provided by the State under PMAP, and all home and community based services covered under the State's 1915(c) waiver for the elderly. Medicare Part A (Hospital Insurance) covers, in part, inpatient care in hospitals and skilled nursing facilities. It also covers hospice care and some home health care. Medicare Part B (Medical Insurance) covers, in part, doctors' services, outpatient hospital care, and some other medical services that Part A does not cover, such as some of the services of physical and occupational therapists and some home health care. Medicaid requires health plans to provide comprehensive preventive, diagnostic, therapeutic, and rehabilitative health care services. Medicaid covered services include Medicare deductibles and co-insurance, physician visits, medical supplies, dental, mental health, hospitalizations, therapies, prescription drugs, eyeglasses, hearing aides, medical transportation, home care services, care management, and translator services. For those MSHO enrollees who enter a nursing home from the community, the first 180 days of nursing home care is paid through MSHO. Nursing home care after 180 days is covered through the fee-for-service Medicaid program. Likewise, nursing home care for seniors who are already in a nursing home when they enroll in MSHO are paid through the fee-for-service Medicaid program. Elderly Waiver services include case management, home delivered meals, homemaker, respite care, assisted living, adult foster care, adult day care, companion services, caregiver assistance, residential care services, home modifications, and extended home care services. Few additional services have been added to the MSHO benefit package beyond what is already covered through the existing federal and state programs. Health plans are permitted to provide alternative services if such services are judged to be medically appropriate and cost-effective.

Care Coordination

MSHO health plans are required to provide care management systems designed to ensure access and to coordinate the provision of primary, acute, and long-term care services, including Elderly Waiver services, to MSHO enrollees. The Care Management system should provide each MSHO enrollee with a primary contact person who will assist the Enrollee in simplifying access to services and information. Care coordination is a billable service under the capitation for the Elderly Waiver services but must be funded voluntarily by the health plans and care systems as an additional benefit for those community enrollees not meeting the nursing home certifiable criteria or those who live in a nursing home. At a minimum the care management system developed by the health

plans and care systems must provide assessment services with an initial assessment or screening being made within 30 days of enrollment to determine the enrollee's health needs. Care coordinators are expected to coordinate medical (including both primary and acute care), long-term care, and social services across provider types and settings. Care coordinators are responsible for conducting risk screening, assessment and care plan development, service authorization, and service coordination. In practice, the care coordination is focused on those clients deemed to require more intensive oversight. This determination is made at the annual client screenings, most of which are done by telephone depending upon the client's level of need. Care coordination is seen as an additional specific care function provided through MSHO. Care coordination models vary across the three health plans and for nursing home and community residents. Similar contract requirements for provision of a care management system are included in PMAP; however, the scope of care management under PMAP is primarily directed at primary care services or to coordinate across providers in cases where more than one entity is involved in providing a particular service.

MSHO care coordinators may be registered nurses, social workers, NPs, or physicians. Care coordinator case loads average about 75 for community-based seniors and 150 for nursing home residents.

Rate Cell Calculations

The MSHO Rate Structure includes the following components.

- the Medicare Adjusted Average Per Capita Costs (AAPCC)
- the Minnesota PMAP rates for Medicaid acute and ancillary services
- the average monthly Elderly Waiver payments for home and community-based long-term care services
- 180-day Medicaid nursing facility add-on.

At enrollment and thereafter the MSHO enrollee must be assigned or reassigned to an appropriate rate cell. These are:

- Rate Cell A: community-dwelling residents not functionally eligible for nursing homes or in the Elderly Waiver program
- Rate Cell B: community-dwelling residents who are functionally eligible for nursing homes (NHC)
- Rate Cell C: a conversion rate for enrollees who have been in a nursing home for 180 consecutive days and then move into the community
- Rate Cell D: an enrollee who at enrollment is in an institution or who after enrollment has been in an institution for at least 30 days.

Table 2 shows the rate structure for MSHO by rate cell.

Table 2
Rate Structure for Minnesota Senior Health Options

	A. Community Residents not Nursing Home Certifiable	B. Community Residents - Nursing Home Certifiable	C. Nursing Home Certifiable Conversions – one year post discharge	D. Nursing Home Residents
Medicare	Non-institutional AAPCC (adjusted average per capita cost)	PACE risk adjustor	PACE risk adjustor	Institutional AAPCC
Medicaid Acute & Ancillary	Non-institutional PMAP rate + NF add-on	Non-institutional PMAP rate + NF add-on	Institutional PMAP rate	Institutional PMAP rate
Medicaid Long-Term Care Costs	Not Applicable	Average monthly Elderly Waiver payment	2 times average monthly Elderly Waiver payment	180 days NF liability including Medicare Skilled Nursing Facility days if community dweller enters NF; NF per diems paid directly by state for those who enroll in MSHO while in NF or after 180 days for first group

The federal Centers for Medicare and Medicaid Services (CMS) makes monthly payments for Medicare services directly to MSHO contractors. Specific rates are determined using the Medicare+Choice county base rates with modifiers (e.g., age, sex, county, and institutional status). The risk adjustor of 2.39 is the same as that used under the Program of All-Inclusive Care for the Elderly (PACE), a CMS Medicare+Choice option which enrolls community-based frail elderly.

The Medicaid component of the MSHO rates consists of the same payments that are made to existing contractors for the Prepaid Medical Assistance Program (PMAP) with the following modifications: (1) For Conversions (Column 3), contractors receive the institutional PMAP rate, even though these enrollees are non-institutionalized. They also receive two times the average monthly Elderly Waiver (EW) payment. This rate applies to enrollees who were in a nursing facility for more than six months before discharge; (2) For community-based enrollees who are Nursing Home Certifiable (NHC) (Column 2), contractors receive the average monthly EW payment and the Nursing Facility (NF) Add-on, which is pre-payment for up to 180 days of Medicaid nursing facility per diems. Enrollees are screened to determine whether they meet the nursing home level of care; (3) For community-based enrollees who are Non-NHC (Column 1), contractors receive the NF Add-on.

Enrollment for MSHO, like PMAP enrollment, is on a monthly basis. Plans are not responsible for expenses incurred before the effective day of enrollment (for example, an enrollee might have been admitted to the hospital before the day enrollment takes effect).

Level of Care Assessment Process

Level of care standards for MSHO enrollees determined to be nursing home certifiable are the same as for the State's fee-for-service population participating in the Elderly Waiver program. NHC status under MSHO triggers the Medicare frailty risk adjustment as well as an additional Medicaid capitation payment to cover needed home and community based services. MSHO plans are required to conduct the State's Preadmission Screening (PAS) and reassessment process and submit this information to the State for a final determination. MSHO enrollees must be assessed using the same tool, criteria, and assessment methodology used in the State's established PAS for the FFS Elderly Waiver and be found to meet NHC status through this screening. Annual reassessments are also required according to the schedule in the State's approved §1915 waiver. Plans may either contract with county PAS personnel or may designate professionals from the plan or care system to carry out this function.

Budget Neutrality

The Medicaid capitation rates established for MSHO were designed to be budget neutral. They are based upon fee-for-service experience and are intended to reflect no more than the amount that would be paid for the same mix of enrollees under fee-for-service Medicaid.

Enrollment

Enrollment has grown steadily since the beginning of MSHO operations in February 1997. Enrollment reached 4,767 members by June 2002, an increase of 94% over June 1998 and 12% over June 2001. While growth has occurred in all three health plans, UCare has shown the greatest growth over the past five years – 478% increase between 1998 and 2002. Fifty percent of MSHO members are currently enrolled in Medica; 41% are currently served by UCare, and 9% are currently enrolled in MHP which operates in only one county. Table 3 shows prevalence figures by health plan at the beginning of June in each of the past six years. In order to achieve this overall rate of growth, MSHO has had to enroll nearly twice as many clients, compensating for an approximate disenrollment rate of between 40 – 50% (primarily due to death). The cumulative enrollment in MSHO since February 1997 has been 9,725.

Table 3
Number of Enrollees in MSHO by Health Plan from June 1997 to June 2002

Health Plan	June 1997	June 1998	June 1999	June 2000	June 2001	June 2002
Medica	0	1,780	1,896	2,142	2,456	2,386
Metropolitan Health Plan	242	333	382	375	353	419
UCare Minnesota	106	339	632	901	1453	1962
Total	348	2,452	2,910	3,418	4,262	4,767

Note: Medica rolled over its Medicare "Senior Care Dual" product in September 1997. Scott County was added in 1999, Washington County in 2000, and Carver, Sherburne, Wright, and Mille Lacs Counties were added in 2001.

Sixty-five percent of the MSHO members live in nursing homes. Approximately 14% of MSHO enrollees live in the community and receive Elderly Waiver services; another 21% live in the community and are not nursing home certifiable (NHC). While the majority of MSHO clients still live in nursing homes, the rate of growth in the nursing home population has slowed over the past several years while the rate of growth in the community population has continued to increase. The percentage of nursing home certifiable members grew 56% between June 2001 and June 2002 and 634% over June 1998. In 1998 community-dwelling NHC members comprised only 3.7 % of all MSHO members.

MHP has the highest percentage of community members, 68%, while in UCare and Medica respectively, 49% and 17% of the members live in the community (see Table 4).

Table 4
MSHO Enrollment by Health Plan by Rate Cell Category
June 2002

	Medica		Metropolitan Health Plan		UCare Minnesota		Total	
Rate Cell Category	Number	Percent	Number	Percent	Number	Percent	Number	Percent
A - Community	236	10	185	44	565	29	986	21
B – Nursing Home Certifiable	167	7	102	24	399	20	668	14
C – Nursing Home Conversion	6	0	0	0	6	0	12	0
D – Nursing Home	1,977	83	132	32	992	51	3,101	65
Total	2,386		419		1,962		4,767	

Disenrollment

Disenrollment from MSHO for voluntary reasons has been relatively small, as a part of overall disenrollment. MSHO clients are not required to give a reason for disenrollment and no standard reporting format is used. DHS has conducted a disenrollment survey (or utilized a disenrollment survey administered by DHS's Performance Measurement and Quality Improvement Division for PMAP clients) to gather information about reasons for disenrollment. The number of surveys returned has been small. The majority of responses given focus on clients not wanting to change doctors or clinics. Other responses include unhappy with network, did not want a care coordinator, didn't want to change case worker (county?), specialist not available, liked old coverage better, unhappy with MSHO, did not understand MSHO product.

Other non-voluntary reasons for disenrollment include change in Medicaid status, loss of Medicare Part A or B coverage, or loss of Medicaid coverage due to having medical spend-down, relocation outside of MSHO service area, and death.

METHODOLOGY

Study Population

The Minnesota dual eligible demonstration is based upon voluntary enrollment and therefore does not use an experimental design; all elderly dual eligible beneficiaries in the designated counties have the option of enrolling in the demonstration program. Because the demonstration does not establish a control group, the evaluation must use a quasi-experimental design and construct a comparison group. Therefore, the study evaluation design includes an experimental group (MSHO enrollees) and a combination of two control groups consisting of dually eligible individuals in order to ensure comparability and resolve the issue of selection bias. By comparing the MSHO enrollees to a group that was comparable but did not have the option to enroll (they were outside the enrollment area), we can control for the effect of selection. Using a group that is exposed to the same group of providers but chose not to enroll in MSHO (the in-area control group), we can examine the effect of enrollment. Both control groups include individuals enrolled in the Prepaid Medical Assistance Program (PMAP) and in Medicare. Parallel efforts were conducted with nursing home residents and community-dwelling enrollees.

Experimental and in-area control groups were defined by counties where MSHO was in operation during the period of our data collection (1997 – 2000) - Hennepin, Ramsey, Anoka, Dakota, Scott, and Washington counties. Out-of-area control groups were chosen from areas that had PMAP in place and were of a population size such that they had health care service availability similar to the areas where MSHO was available. For this reason, the areas of St. Louis, Sherburne, and Stearns counties were selected to serve as out-of-area controls. Sherburne County was included in the MSHO program in 2001, a year after our data collection period. PMAP enrollees from this county will only be represented in our study as out-of-area controls.

The sample 'universe' consisted of all dual eligible individuals (those enrolled in PMAP and Medicare) who lived in the defined study areas and satisfied these criteria for at least one month. This information was obtained from state enrollment data from March 1997 to December 2000.[1] Data from the State identified persons by Medicaid identification number and Medicare identification number, social security number, and basic demographic data such as age, gender, and marital status. Enrollment information was provided by person on a monthly basis, consistent with enrollment and disenrollment policies for MSHO. Based upon enrollment information provided from these files, individuals were identified as living in the community or a skilled nursing facility, and further separated into experimental, Control-In-area or Control-Out-of-area groups based on their enrollment status and area of residence on a monthly basis. This process yielded 29,964 dually eligible persons or 714,720 person months. Because people could join MSHO at any time, status in MSHO versus control groups for purposes of our study was determined monthly. (Note: The problem of potential bias in terms of under-representing

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[1] The sample used for the utilization analysis was much more comprehensive than that used in the earlier surveys for function and satisfaction.

minority groups encountered during the satisfaction survey is not a problem in this analysis, which includes all participants.)

Data Collection
Data Sources

Medicare identification numbers (HICs) and Medicaid identification numbers (PMIs) for these 29,964 individuals were then used to collect all relevant enrollment, claims data and nursing home data. We specifically collected all auxiliary data available between 1995 (prior to the start of MSHO) and 2000 for those individuals determined to be eligible for our study. Claims data came from two major sources – State of Minnesota Department of Human Services (DHS) and Medicare. The State of Minnesota DHS data included encounter data for both MSHO and PMAP enrollees and fee-for-services claims for those services not covered by either program but covered under Medicaid (e.g. nursing home per diems). Health plans are required to submit to DHS on a quarterly basis claim-level encounter data specific to the individual enrollee detailing all medical and dental diagnostic and treatment encounters (inpatient and outpatient), all pharmaceuticals, supplies and medical equipment, all home care services, and home and community-based waiver type services, and all placements in long term care facilities. Encounter data are submitted electronically using standard claim formats used in fee-for-service billing (e.g. HCFA 1500 form for physician services and home and community-based waiver services, UB-92 form for inpatient and outpatient hospital services and nursing facility room and board services covered under Medicare, ADA [American Dental Association] for dental services and RSI [Residential Services Invoice] for nursing facility room and board which are the responsibility of the State Medicaid Agency.)

Encounter data are structured in the State DHS data warehouse to look like claims in the fee-for-service environment, however, they are not actual claims. Encounter data are similar in form, but are different both in content and in purpose. Whereas fee-for-service claims are submitted primarily as a mechanism by which medical providers were paid for services, encounter data are submitted in batches as a means by which DHS can measure pre-paid medical activity. While encounter data are checked by DHS upon receipt, encounter data do not need to pass all of the same edits required for fee-for-service claims. Encounter data can be submitted on a schedule separate from that of fee-for-service claims. In addition, as long as 90% of the batch of encounter submissions pass the edit tests, 100% of the batch is accepted into the State system. This means that up to 10% of all claims in the batch may not meet all edit criteria. A list provided by the State of some of the differences in editing procedures is included in Appendix A.

To obtain Medicare claims data, we submitted a finder file with Medicare Health Insurance Claim (HIC) numbers for those individuals determined to be eligible for our study. Based upon those HICs, CMS created a cross-reference file, producing all other known HICs associated with that individual. Based upon the complete list of HICs, CMS provided us with Denominator, MedPAR, Outpatient, Carrier, Home Health, and Hospice data files. A separate dial-up group health plan (GHP) file was also utilized to determine enrollment in a managed care Medicare product.

We also gathered nursing home data from two sources – State Quality Assurance Review (QAR) records from the State of Minnesota Department of Health and Minimum Data Set (MDS) files from CMS. This data provides information on physical functioning, and level of care needs for nursing home residents. These two files were searchable by State or CMS at the individual level. We received data for all nursing home residents living in Minnesota between 1997 and 2000. We first had to link data in these files to our study sample for appropriate time periods.

Study Group Definition

As discussed previously, enrollment information was provided for each person on a monthly basis and people could join MSHO at any time. Therefore, the status of our study groups – MSHO, Control-In, and Control-Out – was determined on a monthly basis. Likewise, individuals were identified as living in the community or a skilled nursing facility based upon information provided in the enrollment file. Specifically, DHS provided us with a living arrangement designation on a monthly basis. This living arrangement code was determined by county case workers based upon information from the individual/family and nursing homes as part of the process to accurately set Medicaid status. All cross-sectional analyses were completely separate for community enrollees and nursing home enrollees.

Data Cleaning and Validation

In working with secondary data from multiple sources, as in this evaluation, it is impossible to prove that the data are good, accurate, and complete. It is necessary, however, for the integrity of the work, to show that there are no problems in the data. To this end we analyzed missing and inconsistent data, breaking data down by source and by type of service using a total quality management approach to data quality analysis (Wang et al., 2000).

Linking Files on Person Level

First we analyzed the agreement in personal identifiers between all sources of data. A unique MSHO identifier was assigned to all individuals in our sample population as defined in the State DHS person file, resulting in a total of 29,964 individuals including both MSHO and control group enrollees. We confirmed that there was no internal conflict between person data and enrollment data provided by the State and therefore applied this unique MSHO ID to DHS enrollment file. The same procedure allowed us to assign the same MSHO ID to DHS claims and encounter data. All links were organized based upon the internal Medicaid number assigned by the State of Minnesota.

Person information in the DHS system resides in one file whereas person data resides in many CMS files. Therefore, DHS person information was then compared to person information found in the CMS Enrollment DataBase, the GHP file, and the Denominator file. We first tried to achieve an exact match based upon all person identifiers to select a group of consistently defined population across all data sources. Unfortunately this effort resulted in only 70% of the population with a complete match. The remaining 30% was a result of inconsistencies in date of birth, gender, or other

identifiers as well as missing data. To compensate for these data problems, we used a fuzzy merge using all available personal identifiers (PMI number, HIC number, Social Security number, date of birth, gender, date of death, and first and last name) to locate and verify identity of all individuals contained in the three files.

The fuzzy merge process allows us to create partial matches, generating false positive matches. These false positive matches were further analyzed for potential resolution and inclusion. For example, two people might have the same SSN and HIC number but different date of birth and first and last name. This case would be considered as a false positive match and the same MSHO ID would not be applied in the most conservative method. At the same time, the differences in date of birth might be a result of a transposition of two digits or first and last name can be transposed. This inconsistency could be considered as a data entry error, resolved and accepted as a match resulting in the same MSHO ID being applied. We built partial matches based upon all possible combinations of identifiers and explored all obtained matches. To resolve conflicts across demographic information we accepted CMS data as the gold standard.

This process identified duplicates within and between the two data sources as well as unresolvable conflicts. We excluded from our sample 221 individuals because we could not locate a corresponding record in the Medicare Enrollment Database using the HIC number or SSN number provided in the DHS file. We also excluded from our study population 56 individuals whose personal characteristics such as name, date of birth, gender, and date of death did not match among the sources of data. For example, one source had a date of death as April 17, 2000, and the other source had a date of death of June 11, 1996. In most of these 56 cases more than one variable was in conflict among the sources of data. For these types of data errors we excluded the entire person from our sample. Total number of excluded people is equal to 275 (with two overlap) or 0.9% of the entire population. The resulting working sample of MSHO and control group PMAP enrollees contained 29,689 persons.

Enrollment Data
In some cases we excluded only the person months where inconsistencies occurred. We examined the agreement between DHS and CMS data relating to enrollment in managed care Medicare or fee-for-service Medicare. We examined information provided in the DHS eligibility file, the Medicare GHO file and the Medicare Denominator file. In those cases where DHS, for example, indicated that the individual was enrolled in MSHO for a particular month but neither the GHO file nor the Denominator file indicated that the person was in a managed care Medicare product, we excluded that specific person month from our analysis. This process resulted in an exclusion of 5,891 person months.

At the time of our data requests, only fee-for-service claims paid by Medicare were available from CMS. No data were available from Medicare for those services provided to Medicare enrollees who were enrolled in a capitated managed care Medicare product. Therefore, we removed from our sample population 69,178 person months due to a lack of complete utilization data when individuals were enrolled in PMAP and were

also enrolled in a capitated Medicare product. Our final working sample (both MSHO and control group PMAP enrollees) consisted of 638,227 person months and 28,297 distinct persons.

Utilization Data

Data regarding the provision of services originates at the provider level and then is submitted to the managed care plan for compilation with data from other providers. It has been observed by the State that managed care plans have been more successful gathering encounter data from providers and subcontractors when the internal payment arrangement between the plan and the provider is not pre-paid capitation. Providers that submit "claims" to the plans as a method of getting paid are, logically, more motivated to submit encounter data (as claims). Providers who have pre-paid capitation payments place less urgency on the process of submitting encounter data to the plan. This may mean that encounter data from pre-paid (capitated) providers is not proportionately represented, compared to providers where claims are submitted for payment. Health plans participating in MSHO have both traditional fee-for-service arrangements as well as capitated arrangements with health care providers.

Realizing the data problems inherent in a system that collects and translates data across various parties for different reasons and uses, the State of Minnesota conducted an external assessment of the concordance or discordance between Health Plan Employer Data and Information Set (HEDIS) data (a mandatory reporting system used to evaluate health care delivery) calculated by the health plans participating in PMAP and MSHO with the same rates calculated using DHS encounter data. The report was prepared by MetaStar, Inc. in April 2001. Overall, the report indicated that selected HEDIS rates calculated using the state encounter data closely agreed with the administrative rates reported by the health plans. Generally, services found in the encounter data matched to services in the health plan's database. In only a small percentage of cases did the encounter data contain services not found in the health plan administrative data. There were indications in the results, however, that not all data found in the administrative records of health plans was found in the state encounter data. The report indicated a larger percentage of cases where services found in the administrative data of health plans were not present in the encounter data, suggesting that the encounter data may not be complete. The report suggested that the difference in rates of services reported may be caused by the specific methods used by health plans to code and identify services. The encounter database used by the state through the edit process accepts only standard codes for ICD-9-CM and CPT to identify diagnoses and procedures. Therefore, plan specific codes were not recognized by the encounter data system if they were not translated prior to submission. In addition, the report stated that different nonstandard personal identifiers were used in some cases causing individuals to be misassigned to a particular program, and resulting in undercounting of services.

We again used a total quality management approach to data quality analysis. We built run charts by source of data and service to visualize the trend in service utilization over time. The assumption was that only random variation or slow trend up or down over time should be found in the utilization data. We assumed that if we found high amplitude

changes over a short period of time that sustained at that level over a period of time that this was an indication of a potential problem in the data. We built business rules regarding how to treat our data as reasonable. All violations in those business rules indicated suspicious data. Where appropriate we compared different types of services to help explain anomalies by providing meaningful patterns in relationships of services, e.g. inpatient hospitalizations where nursing home claims data were missing. All problems were addressed with the State DHS staff resulting in a resubmission of data, provision of additional data elements, or our modifying our business rules to better fit the data. This process resulted in the identification of significant underreporting of claims by health plans due to a number of internal data problems. This underreporting was not immediately apparent to either DHS or the health plans. In one instance, a query used by the health plan to identify claims for submission to DHS had been set appropriately for PMAP data but missed all MSHO data for a particular type of bill. Only after further research by staff at the health plan and in comparing frequencies prepared by the health plans, DHS, and the University of Minnesota, was the health plan able to identify the source of the problem. The health plans resubmitted missing claims, in some cases resubmitting several years' worth of encounter data. Subsequently, a new data submission was provided to us by DHS. Nevertheless, we were not able to solve some problems and flagged data where services fell outside our business rules as not trustworthy.

Service Definitions

      Based upon the enrollment of the person and the rules of the specific programs, we expected to find claims for experimental and control groups in particular files. During the period of MSHO eligibility we expected to find all claims data in the State data files only and not in the Medicare claims files. PMAP claims would be found in either Medicare or State files or both depending upon the type of service and payment rules (Medicare is always primary payor and Medicaid is the secondary payor). If an assumed error occurred in the payment of a claim, it was difficult to determine based upon claims data whether or not the service was actually delivered. Therefore, we assumed that all positive paid/recorded claims represented service delivered and were included in our analysis no matter the source of these claims. In general, the number of these mislocated claims did not exceed 2% to 5% depending on service. From a practical standpoint, this assumption resulted in our merging data sources for our entire study population. Services were attributed to MSHO or control groups based upon eligibility data and not on source of claims information.

      Merging data sources required that consistent definitions of services be used. The encounter data resembles standard Medicare files and data, following to some extent the UB92 (also known as HCFA 1450) and HCFA 1500 claim formats. DHS has created some additional variables, for instance Category of Service, and uses some definitions for types of services, for example, that are different from those used by CMS. In addition, edit rules applied to encounter claims are different than the edit requirements used for Medicare fee-for-service claims. As a consequence, health plans and providers may provide a different level of information for similar types of claims. In general, we used definitions of services based upon standard definitions applied to Medicare data in other

research studies. Frequencies were then run using DHS data using the Medicare variable definition. If differences in frequencies exceeded 50%, this triggered a further examination of each variable within the definition. In some cases we found that the service definitions were not compatible. For example, place of service used to restrict physician services to the physician office or other outpatient setting in Medicare data was missing in more than 70% of cases in DHS data. This resulted in service definitions becoming less restrictive and narrow and more inclusive or general. We also discovered that the rate of reporting diagnoses was far less for MSHO enrollees than for PMAP enrollees. As a consequence, we tried to limit the use of diagnoses in service definitions. The health plans also told us about recoding done at the plan level before submission of data to DHS; for example providers would submit revenue codes on a UB92 claim, the health plan would convert it into a procedure code for internal purposes but prior to submitting data to DHS the information would be recoded again to a revenue code in order to meet DHS data requirements. A complete list of specific service definitions is found in Appendix B.

Cost Data

        Costs for purposes of this analysis refer to the cost to the government (Federal or State) for the provision of acute and long-term care services. In the case of MSHO this means a Medicaid capitation payment, a Medicare capitation payment and where applicable direct reimbursement to providers for nursing home services on a fee-for-service basis. For the control group the cost to the government includes a Medicaid capitation payment, Medicare fee-for-service payments and may include elderly waiver claims and fee-for-service nursing home payments.

        The total cost to the government for MSHO was calculated based on the actual Medicaid capitation (including the applicable PMAP rate, nursing facility add on and average monthly EW payment appropriate to each rate cell) per member per month, averaged across twelve months for each year 1998, 1999 and 2000. Similarly the actual Medicare capitation rate paid by the government per member per month was averaged over 12 months for each year 1998, 1999, and 2000. In some cases the State of Minnesota also paid fee-for-service nursing home claims for some MSHO members. This amount is broken out separately from the capitation payments. There is no attempt to track capitations per member per month with actual service utilization using encounter data.

        Control group costs were calculated by identifying PMAP capitation payments per month as well as actual paid claims per member per month by payor – Medicaid, Medicare and elderly waiver. These costs were summed and averaged over 12 months for each year 1998, 1999 and 2000. If a service was paid for through fee-for-service (not included in the PMAP capitation), we used service from date and service to date to attribute the FFS payment to a given month. If the FFS service from date and service to date spanned more than one month (this primarily affected fee-for-service nursing home claims), we took the total dollar amount and averaged it across each month covered by the service dates attached to the claim. Our focus again, was on total cost to the government per member per month.

The MSHO Medicaid capitation used in our analysis reflects what the State paid the health plans. Some Medicaid enrollees are required to pay a spenddown contribution as part of eligibility for Medicaid. Patient contributions made to the State under MSHO were not available and therefore are not accounted for in our analysis, hence the cost to the State may be over stated. It is estimated that only 1% of MSHO community member months were impacted by patient spenddown requirements. Once in a nursing home, only the first 180 days covered by the MSHO plans may be subject to these uncounted institutional spenddown amounts. Stays after the 180 days would be handled the same way they are for non MSHO enrollees as FFS Medicaid payments based on the per diem nursing home rate minus the patient contribution. The vast majority of nursing home days for MSHO enrollees are FFS suggesting that the over counting of State costs related to this issue may be small.

We attribute per member per month MSHO capitation payments from Medicaid and Medicare to the health plans to community or nursing home based upon the living arrangement of the individual during that month as indicated by the State and the assigned MSHO rate cell for that individual. By definition the nursing facility add-on payment, part of the Medicaid capitation payment, is paid while the individual is in the community as an incentive based or pre-payment for nursing home care. The 180 day nursing facility liability paid by the health plans once the individual enters a nursing home may occur while the individual is still identified in our analysis as a community person (part of a short-term nursing home stay for rehabilitation, for example) or after the individual has transferred to nursing home status for purposes of our analysis.

Minimum Data Set and Quality Indicators

We used MDS data to examine quality indicators for nursing homes in MSHO and the two control groups. MDS records were available between June 1998 and December 2000. We selected all quarterly and annual records from the MDS and excluded the admission records (QIs should not be affected by nursing home quality at admission) and discharge records (no QI variables are available). We then matched these MDS records to either the MSHO group or one of the two control groups (Control-In or Control-Out), using the information on MSHO enrollment between 1997 and 2000.

The next step involved selecting MDS records for analysis. We wanted to examine the quality at several different points in a resident's stay. From enrollment into MSHO or PMAP we chose as period 1, 6-9 months following enrollment; as period 2, 12-15 months following enrollment; and for period 3, 18-21 months following enrollment. For example, for those individuals enrolled into MSHO or PMAP in January 1998, we selected MDS records occurring between July and September 1998 for the 6-9 month period 1 analysis. Another way to describe the process is we: 1) identified all MDS records, 2) subtracted the enrollment date from each MDS record date, and 3) selected the MDS record that fell closest to the 6-month, 12-month, and 18-month points. Any MDS records that fell within these periods were selected. If there was more than one record per resident in any of these three periods, the record that was closest to the 6-month, 12-month, and 18-month points was used. Table 5 shows the distribution of records in each of these three periods.

Table 5
Distribution of Records by Period
Nursing Home Quality Indicators Analysis

Period	MSHO	Control-In	Control-Out	Total
1 (6 – 9 months following enrollment)	1,213	982	424	2,619
2 (12 - 15 months following enrollment)	1,503	1,346	642	3,491
3 (18 - 21 months following enrollment)	1,589	1,676	798	4,063
Total	4,305	4,004	1,864	10,173

Table 6 describes the samples that were used at each period.

Table 6
Characteristics of the Samples by Study Groups in Periods 1, 2, and 3
Nursing Home Quality Indicators Analysis

Variable	Period 1 (6 – 9 months following enrollment)			Period 2 (12 - 15 months following enrollment)			Period 3 (18 - 21 months following enrollment)		
	MSHO	Control-In	Control-Out	MSHO	Control-In	Control-Out	MSHO	Control-In	Control-Out
Sample Size	1,213	982	424	1,503	1,346	642	1,589	1,676	798
Mean Age	84.6	83.0	84.5	84.9	83.6	85.1	84.89	84.14	85.9
% Female	78	74	68	80	75	73	79	76	77
% Race (not white)	4.9	4.9	5.0	4.9	4.9	5.0	4.9	4.9	5.0
Mean Length of Stay	1,421	818	618	1,624	948	804	1,917	1,501	1,362
Median Length of Stay	926	510	455	1,132	630	553	1,457	1,092	910
# of Facilities	110	138	43	114	146	46	118	243	46
Average # Residents/ NH	11.0	7.1	9.9	13.2	9.2	14.0	13.5	6.9	17.3

Twenty-four quality indicator (QI) measures were constructed based on the algorithms developed by Zimmerman (Zimmerman et al., 1995), which are now widely used by CMS. Although the original QIs were basically presented without adjustment, we felt it necessary to adjust the rates for differences in resident characteristics. The challenge is to identify those characteristics that can affect the QIs but are not under the influence of the nursing home. Because this distinction is difficult, we opted to use two levels of adjustment. The comprehensive approach included a wide range of resident characteristics. The conservative approach used a much smaller subset of adjusters. Except for a few exceptions, values for the adjusters came from the same assessment. In some instances we deliberately wanted to use lagged measures to minimize the chance of endogeneity. Not all diagnoses are collected on the quarterly assessment. If a diagnosis was missing, the value from the most recent full assessment before the assessment date was used. History of resolved ulcers and demographic information were treated similarly; the values from the most recent full assessment before the assessment date were used. Many quarterly records also did not contain information on the admission date. We obtained the admission date information from the both MDS and QAR data files, using the latter if the admission date was missing from the MDS record. If there was more than one admission date per resident, the most recent admission date to the assessment date was assigned as the admission date for that record.

Once this database was prepared, a series of logistic regressions was performed. For each QI measure and each time period a logistic regression was carried out using the comprehensive list plus dummy variables identifying the Control-In and the Control-Out persons. The same process was repeated using the minimal adjustors plus the dummy variables defining study groups. A total of six logistic regressions were carried out on twenty-four quality indicators. A complete list of adjustors used in the nursing home quality indicators analysis is found in Appendix C.

Data
Analyses applied in this evaluation required creating a workable data set from many distinct components. Substantial effort went into developing this data set and assuring its integrity. The data analysis was implemented combining relational database and statistical software. The multi-layer database contained loading, transactional, clean normalized, and analytic tables. Loading tables were used to store raw data in the format we received them. Transactional tables were used during the cleaning and conflict resolution process and had source-specific structure. Normalized tables contained the data without conflicts and a unified structure that supported basic analysis and development of analytic tables for more sophisticated analysis. A step by step discussion of the process used in creating clean normalized data tables is included in Appendix D.

Analytic Methods
Analysis of utilization was conducted using two distinctly different approaches: 1) a cross sectional longitudinal analysis and 2) a matched cohort longitudinal analysis. Each method answers questions from a slightly different perspective. The cross sectional approach involved calculating the utilization for each month, creating, in effect, a new sample each time. Thus a person could be in PMAP one month and enroll in MSHO the next. This approach yields a series of cross-sectional analyses, which are then aggregated to create an average monthly rate. Adjustment for repeated measures of the same people at different time points is implemented by using generalized estimating equations. The cross sectional approach uses the full sample available and produces the results that are generalizable to the entire population. The cross sectional analysis emphasizes the general effect of MSHO as a program. Results focus on the change in MSHO the program over time with subgroup analyses completed to determine the effect of different duration of enrollment in MSHO. Questions of selection bias are addressed through statistical adjustments for patient characteristics. Recently various methods of cross sectional time-series analysis have become increasingly popular in epidemiology (Carlin et al., 1999). The growth of applied interest in these methods led developers of statistical software STATA to say: "Panel data models have exploded in the past 10 years as analysts find it more common to need to analyze a richer structure of data." The reason is the possibility to use all available data while taking into account complexity of the study (nested design, repeated measures, missing observations). The most common statistical approach that STATA provides for this analysis is an implementation of generalized estimating equations that takes into account correlation between multiple observations of the same person. Unstructured correlation matrix allowed us to accommodate "no-restriction" approach but was very demanding from the viewpoint of time and computer resources due to slow convergence. Therefore, we tested models with independent

correlation structures and found them to provide us with approximately the same results but several times faster.

The matched cohort design is a more traditional approach that involves selecting a comparison sample that is similar to the experimental group, in this case MSHO. The cohort analysis emphasizes the effect of MSHO enrollment on a personal or individual level, aggregated across the cohort. Because the enrollment into MSHO (and into PMAP) is continuous (i.e., people continue to enroll during the course of the study), there is no clear starting point for the demonstration; therefore, the experimental cohort is a moving cohort. A person was classified as a member of the experimental group if he/she participated in the MSHO program at some point in time. Based upon the quasi-experimental design there is a fixed limited control population that is not initially matched to the experimental group. The control population consisted of people who have never been enrolled in MSHO and did not change their allocation (Control-In and Control-Out) over time. Control people were matched based on pair-wise selection with replacement. It allows every control person to serve as a match for different study people at different time moments and to participate in the corresponding control cohort more than once. A virtual MSHO enrollment date was assigned to controls based on (but may not be equal to) the enrollment date of the matched study person. The overall sample was smaller using the cohort method as compared to the cross sectional method. Questions of selection bias are not adequately dealt with by creating the retrospective cohorts and must be addressed through statistical adjustments.

In both methods variables used to match groups or as risk adjustors included gender, race (white/non-white), age, original reason for enrollment in Medicare (elderly/disabled), duration of dual eligibility, prior health care utilization, and an indicator of frailty that was based for community populations on participation in the Elderly Waiver program for controls and using the rate cell ("B") for study persons and for nursing home enrollees, the duration of nursing home stay and Morris MDS score. The statistical significance of the difference between MSHO and each of the two control groups was calculated by using regressions that adjusted for various factors. The regression equations used three different levels of adjustment: 1) raw data with no adjustment, 2) adjusting for demographic variables (deciles of age, white/non white, and gender, original reason for enrollment in Medicare (elderly/disabled), duration of dual eligibility, an indicator of frailty that for community enrollees was based on participation in the Elderly Waiver program for controls and using the rate cell ("B") for MSHO persons and for nursing home enrollees was based on the duration of nursing home stay), and 3) adjusting for the same demographic variables and prior utilization.

Cross Sectional Methodology
Six major groups for monthly longitudinal cross-sectional analysis included MSHO, Control-In, and Control-Out broken down by residency (Community and Nursing Home). In some cases a more detailed breakdown (by sources of information) was used. This process resulted in a time series of outcomes with one-month time intervals. We needed to obtain estimations that represent outcomes in analyzed subgroups and are stable over time. Some people can join or leave subgroups, or move from one

subgroup to another; and this process is not completely random. Any attempt to generalize the results across several months should take into account this transition. From a statistical viewpoint this phenomenon creates a correlation between estimations calculated for different months of observation.

Addressing this correlation cannot be done as a generalization of Group/Month Tables. When they were built, the correlation information was lost. Therefore, we had to come back to Person/Month Tables and start an aggregation process from this point specifically concentrating on the correlation data. Assuming a three-year observation period, a 36x36 correlation matrix has to be identified every time a statistical comparison is carried out. Generalized estimating equations with unstructured correlation matrices were tested. We found that in most cases the correlation coefficients do not exceed 0.1, and observations in different months are almost independent. Then we compared the models based on unstructured and independent correlation matrices and found that the difference in regression coefficients does not exceed 1-5% and does not change the conclusion about the studied subgroups. This observation allowed us to use independent rather than unstructured correlation matrices without significant loss of accuracy of the results. It is well known that generalized estimating equations with independent correlation matrices are equivalent to linear regression. It allowed us using regular logistic and/or ordinary least square regression (depending on the outcome) and dramatically accelerate the calculation time. According to this approach multiple observations of the same person during consecutive months are viewed as independent and the number of observations during different months is treated as approximately equal. During the exploratory phase of the project we confirmed that both conditions are satisfied.

When comparing outcomes between different subgroups, we have to acknowledge the fact that they might have different compositions. The cross sectional approach employs retrospective statistical adjustments, whereby we control statistically for the effects of the variables that might have been. The goal of adjustment is to correct for factors that are attributable to the client characteristics but are not attributable to the intervention. Two groups of risk-adjustors can be used to adjust for differences in the study populations. Concurrent risk-adjustors were measured during the same month when the adjustment was made. Variables available to us included gender, race (white/non-white), age, original reason for enrollment in Medicare (elderly/disabled), duration of dual eligibility with correction for left censoring, and frailty measured by rate cell for MSHO community enrollees and Elderly Waiver status for control group community enrollees or nursing home length of stay for nursing home enrollees. These items have one important advantage - they preserve our entire sample into the calculations. The second group is historical adjustors. Choosing adjusters requires walking a fine line. Some adjusters may account for a lot of variance but they adjust away differences that we want to preserve. For example, if we used use of services last year to see if the source of coverage this year influences usage (and source of care had not changed), we might adjust away differences in use that were really attributable to coverage.

More comprehensive adjustment should take into account medical status of patients. We initially expected to include two groups of measures into the list of historical adjustors: medical diagnoses (extracted from all available sources, aggregated into several groups and coded as binary variables) and history of healthcare utilization (emergency and inpatient services). Unfortunately, the data quality analysis showed that the rate of diagnoses among the MSHO population was approximately half of all diagnoses encountered in the study groups (see Table 7). This difference was not based on encounters having a diagnosis but on the number of diagnoses listed per encounter. We worried that this difference reflected significant under-reporting, which is often found in reporting systems that do not generate payments. Because this difference would potentially penalize MSHO unfairly, we decided not use diagnoses in our risk adjustment models. We should note that our decision is conservative and favors MSHO.

Table 7
Diagnoses Rates (%) in Three Random Periods

	Period 1			Period 2			Period 3		
Diagnoses	MSHO	Control-In	Control-Out	MSHO	Control-In	Control-Out	MSHO	Control-In	Control-Out
Infection and parasitic	1.5	2.4	4.5	1.4	1.8	3.6	1.3	1.8	2.9
Malignant neoplasm	1.5	2.3	2.9	1.3	2.1	2.8	1.5	2.2	2.1
Diabetes	2.7	7.1	7.5	3.1	7.3	7.0	3.5	6.9	7.0
Gastrointestinal	4.3	5.7	6.1	3.4	5.0	4.9	3.5	5.0	4.9
Musculoskel/ connective	9.4	13.5	13.0	8.6	12.3	11.1	7.5	10.6	11.6
Hematological	2.6	3.5	5.0	2.6	4.6	5.2	2.0	3.8	4.2
Cognitive Disorders	8.2	8.6	9.4	7.5	7.3	8.8	6.5	5.7	7.8
Neurological	4.0	4.8	5.5	3.2	4.4	6.0	3.4	3.8	5.1
Cardio-Respiratory Arrest	0.3	0.4	0.3	0.3	0.5	0.2	0.5	0.5	0.5
Heart	12.2	18.0	19.1	10.8	18.5	18.0	9.3	15.9	16.2
Cerebro-vascular	5.0	5.8	8.6	3.9	5.1	7.7	2.8	4.4	6.5
Vascular	3.6	5.2	4.1	2.0	5.6	3.9	2.0	4.4	3.5
Lung	4.9	7.0	6.4	3.7	6.2	4.7	4.5	5.9	5.6
Urinary system	3.0	5.9	6.9	3.0	6.5	6.8	2.8	6.0	6.5
Skin/subcutaneous	3.0	4.0	4.3	2.1	3.6	3.6	2.0	3.0	3.2
Injury/poison/ complications	4.9	5.5	6.4	4.4	5.5	5.8	4.1	4.8	5.4
Major system abnormalities	4.5	8.4	7.0	4.4	8.1	7.4	5.0	8.0	6.1
Valid N	1,982	8,980	2,439	2,518	8,604	2,535	2,793	8,673	2,486

Given that we suspected bias in the rate of reporting of diagnoses and that we had no comparable data on the full sample on functional status, the best way to approximate this information using available datasets is to estimate the health care history of patients. There is a real concern, however, about how these measures are identified for use in the analysis. Ideally, we want to apply appropriate adjustments without adjusting away or over-explaining the variance in the phenomenon that you are studying. Thus, although it may seem desirable to use utilization data as proximate to the point of enrollment as possible, several problems arise. Given the nature of our analytic approach, each MSHO enrollee has a unique date of enrollment, which does not correspond to any change in the status of control persons. Our approach examines each month of utilization. The utilization experience just prior to the current month of analysis is likely to be closely linked to what happens in the month of interest because the same factors will likely influence both. It is unlikely that the patterns of care will change from one month to the next. Thus, adjusting for immediately proximate utilization will threaten to remove (or underestimate) the very differences we are trying to detect. To avoid this problem of endogeneity, we created a 12-month window. All historical measures were extracted from the time intervals that cover the period 18 to 12 months prior to the current month. We wanted six months of information in order to measure a more stable period. We went back a full year to begin measuring utilization and diagnoses in order not to confound the period we were using to create the adjuster with the months we are studying. For example, to derive historical risk-adjustors for a January 1999 comparison, the time interval included July-December 1997. February 1999 comparison would include the reference time interval from August 1997 to January 1998. The following diagram may make this approach more understandable.
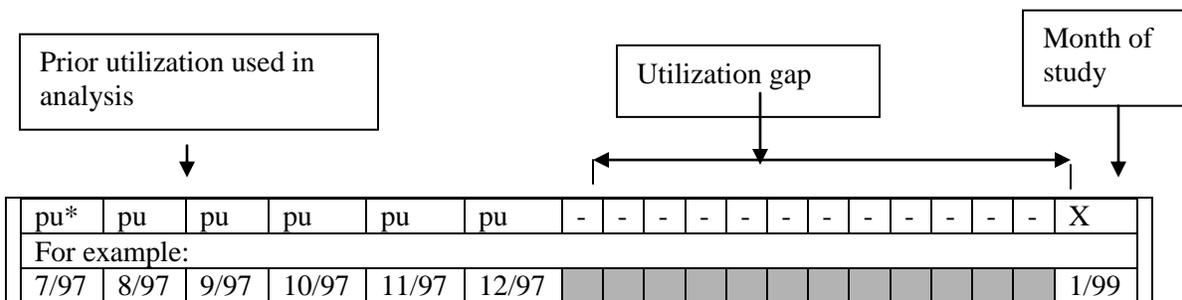
* prior utilization

It is important to note that this approach requires patients to have at least 18 months of known history of resource utilization. As a result the study sample loses approximately 50% of its size and also loses all new dually eligible persons in our sample.

Cohort Methodology
To enable the cohort analysis, six cohorts were created: two experimental (MSHO) cohorts (community and nursing home) and four control cohorts (in-area and out-of-area, community and nursing home). The MSHO cohort was a moving cohort based upon the time of enrollment. The control cohort was created using pair-wise selection with replacement. It allows every control person to serve as a match for

different study people at different time moments and to participate in the corresponding control cohort more then once. A virtual MSHO enrollment date was assigned to controls based on but may not be equal to the enrollment date of the matched study person.

A person was classified as a member of the experimental group if he/she participated in the MSHO program at some point in time. The month when this person joined MSHO was coded as the enrollment date and used to assign him/her to the community or the nursing home group depending upon living conditions during this month.

The population of candidates for inclusion into the control cohorts consisted of people who have never been enrolled in MSHO and did not change their location (in-area and out-of-area status) over time. The matching process included pairwise matching or selection with replacement. Not all potential candidates from the control population were actually matched and assigned to a control group cohort. The same potential candidate for the control cohort during one month could be in the nursing home and during a different month be in the community. Since the matching process included pairwise matching of the best fit control person with the MSHO experimental person with replacement, the same candidate control person could participate in the matching process more than once. Potential control cohort participants were matched to MSHO enrollees using a large number of variables including community versus nursing home status. In order to achieve the best fit the control person base line or virtual enrollment month being matched to an MSHO enrollment month needed to have the smallest dissimilarity across all variables being used. Once the control person was matched, and the person was assigned to a specific control cohort, they did not change control groups (community versus nursing home or Control-In or Control-Out). That control was assigned a virtual enrollment date that corresponded to the MSHO matched client. The same control person using a different base line virtual enrollment month could, however, be used again to be matched to a different MSHO experimental person with a different enrollment month. Any change in status (for example admission into a nursing home for people in the community cohorts, both experimental and control) is considered as an end point (outcome) for analysis.

We examined many different possibilities for creating the cohorts and used pairwise selection with replacement as the best method to match on a large number of multidimensional variables ensuring that the cohorts were as similar at baseline as possible. While the control population was larger than the MSHO population, not all potential PMAP enrollees would produce the best fit or match with MSHO enrollees.

A total of 1285 members of the MSHO community group were included in the matching process (experimental community cohort). Community Control-In population was presented by 213,418 person-months that were measured in 8,682 people. The corresponding numbers for Control-Out community population were equal to 43,798 person-months and 1,865 people. The number of members of MSHO nursing home group was 1,985. Nursing home Control-In population that served as a source for the in-area

control cohort contained 86,819 person-months observed in 8,011 people. Similarly Control-Out was presented by 2,840 people and 46,669 person-months.

Building matched control cohorts required selecting 1,285 person-months for each of the two community control cohorts and 1,985 person-months for each of the two nursing home control cohorts. Matching assumes that the distribution of parameters of the control cohorts looks similar to the distribution of the parameters of the corresponding experimental cohort. There are many ways to achieve this goal. We selected an algorithm that fits well the conditions of the study (limited control population). This algorithm is based on pair-wise selection with replacement. It allows every control person to serve as a match for different study people at different time moments and to participate in the corresponding control cohort more than once. A virtual MSHO enrollment date was assigned to controls based on but may not be equal to the enrollment date of the matched study person.

All groups were matched based on gender, race (white/non-white), age, original reason for enrollment in Medicare (elderly/disabled), duration of dual eligibility with correction for left censoring, time between Enrollment Date of a study person and running Virtual Enrollment Date of a control person, and six months history of health care utilization (inpatient admissions, inpatient days, emergency events) coded as four-level categorical variables. When matching community populations this list was supplemented with an indicator of frailty that was based on participation in the Elderly Waiver program for controls and using the rate cell ("B") for study persons. When matching nursing home samples, the duration of nursing home stay with correction for left censoring and Morris MDS score were taken into account.

The algorithm required the two matched people to have the same gender, race, reason for enrollment in Medicare, frailty, and indicators of left censoring of the start date of dual eligibility and nursing home admission. The analysis showed that there was always more than one control person-month that satisfied this condition. The statistical distance measure (which reflects dissimilarity) between study persons and trial control person-month was computed as weighted sum of distances between all other variables listed above (duration of dual eligibility and nursing home stay, age, prior six month history of utilization, and time between enrollment date of a study person and running virtual enrollment date of a control person) for all pairs and the pair with the shortest weighted sum of the distances was selected.

Despite having pairs of control and experimental people, the analysis was implemented assuming independent samples. MSHO enrollment (virtual enrollment) date was used as a start time point for all beneficiaries. The results were averaged for the first 6, 12, and 18 months and compared across groups using standard Student's t-test. A more detailed analysis was implemented using linear regression with dummy variables that allowed comparing control groups directly with the corresponding experimental group. Regression models were calculated without and with risk-adjustment. The risk-adjustors included the same variables that were applied during the matching. The role of risk-

adjustment was to eliminate effects of the intra-group variation and to improve the sensitivity of the comparison.

In addition, we created a separate cohort to analyze if MSHO changes the discharge patterns of nursing home residents.

To answer the question if MSHO changes the pattern of discharge from nursing homes, the initial cohort of all nursing home stays during 1998-2000 (9,835) was constructed. We needed one month of post-discharge data to distinguish successful and unsuccessful discharges. The database stored information until 12/31/2000. Therefore the cut-off point for censoring was set as 11/30/2000 to have at least one month of post-discharge information for all discharged persons. All stays where a person was not discharged or discharged after 11/30/2000 were treated as censored. For non-censored cases (actual discharge) length of stay was calculated as difference between the admission and discharge dates. For censored cases, length of stay was calculated as difference between the admission date and 11/30/2000. Actual discharges were classified as successful and non-successful. Successful discharges were defined as "being alive and not having hospital or nursing home admission during one month after discharge." Any of these events (death, hospital, or nursing home admission during the first month after discharge) classified the discharge as unsuccessful.

To break down the initial cohort into MSHO and Control groups we applied two criteria. First criterion was developed to take into account the fact that many people in the initial cohort were losing their dually eligible status for at least one month during their nursing home stay. We required that the total duration of dual eligibility during the nursing home stays should be more than 70% of the nursing home stay. This criterion reduced the sample size to 6,131 stays that belonged to 5,883 people. The number of repeated admissions was too low (248) to necessitate corrections for the nested structure of data. Second criterion classified persons as MSHO or Control based on the prevalence of their enrollment into MSHO and PMAP. Allocation of stays into Control-In and Control-Out groups was done based on the county of residence at the moment of their admission into the nursing home.

The analysis was targeted toward comparing the frequency of discharges in the MSHO group with Control-In and Control-Out while correcting for length of stay and right censoring. The most appropriate tool in this situation is Cox regression because it also allows using covariates like age and gender to adjust for potentially different mix of patients. Stays were classified as short and long using different thresholds. We defined short stays as not greater than 30 days or not greater than 60 days. Long stays we classified as greater than 60 days, or greater than 365 days, or greater than 730 days.

Separate analyses were implemented for all discharges, and also for successful and unsuccessful discharges. In the first case the dataset included all successful and censored discharges. In the second case the dataset included all unsuccessful and censored discharges.

We also used MDS records to study the percentage of successful discharges (discharges to community with no expectation of return to nursing home) between MSHO and the two control groups. MDS records were available between June 1998 and December 2000. We first selected all records of discharge to private home or apartment or board and care facility or assisted living facility. We excluded records for which return to nursing home was anticipated. Residents who had more than one discharge record were also excluded from the analysis. We merged this discharge record with the first MDS record of each individual resident. We calculated the length of nursing home stay by calculating the difference between nursing home admission date and discharge date. For residents who were not discharged before December 31, 2000, the difference between their admission date and December 31, 2000, was used. The final sample size was 14,333 residents. Among those 14,333 residents discharged, 409 were discharged to community. We also conducted logistic regression analyses on the likelihood of discharge by MSHO or control status

Descriptive Data

Comparison of Enrollees

In many respects, the MSHO population is very similar to the PMAP population in the two control groups. To illustrate the composition of the different groups we compared them based upon gender and age, place of residence in terms of community versus nursing home, and place of residence in terms of geographic county, health plan, and race. Data that follows is based upon our final working sample after exclusions previously discussed were completed.

Tables 8 through 14 present a point in time comparison of MSHO to the two control groups on a number of different parameters. January 1999 is presented as the reference point as it is approximately midway through the time period covered by this evaluation (February 1997 through December 2000). Tables 8 and 9 indicate the distribution of enrollees by age and gender. MSHO enrollees are predominately female as is the case in the Control-In and Control-Out groups. Women enrollees are somewhat older than men. Control-In women and men are somewhat younger than MSHO or Control-Out enrollees.

Table 8
Percent of Enrollees by Gender and Study Group
January 1999

Gender	MSHO		Control-In		Control-Out	
	Number	Percent	Number	Percent	Number	Percent
Female	2,116	78.11	6,511	74.07	1,908	76.75
Male	593	21.89	2,279	25.93	578	23.25

Table 9
Average Age By Gender and Study Group
January 1999

Gender	Average Age		
	MSHO	Control-In	Control-Out
Female	83.96	79.56	83.02
Male	79.28	76.37	79.50

As shown in Table 10, the majority of enrollees in MSHO and PMAP are white, consistent with the overall population in the study counties. The Control-Out population has the highest percentage of white enrollees while the Control-In group has the highest percentage of minority enrollees. MSHO has made a concerted effort to recruit minorities

and design services specifically to meet the needs of minority groups. As a result, the percentage of white enrollees has dropped since 1999, while the percentage of minorities in general (Asians specifically) has increased.

Table 10
Number and Percentage of Enrollees by Race and Study Group
January 1999

Race	MSHO		Control-In		Control-Out	
	Number	Percent	Number	Percent	Number	Percent
Unknown	21	0.78	114	1.30	24	0.97
White	2,281	84.20	6,199	70.52	2,390	96.14
Black	202	7.46	618	7.03	12	0.48
Other	87	3.21	980	11.15	39	1.57
Asian	96	3.54	774	8.81	9	0.36
Hispanic	14	0.52	66	0.75	3	0.12
North American Native	8	0.30	39	0.44	9	0.36

Prior to 2000, MSHO was operating in four Twin Cities metropolitan counties: Anoka, Dakota, Hennepin, and Ramsey. Scott County was added in 1999 and Washington County was added in 2000. The percent of MSHO enrollees drawn from these counties is similar to the percentage of dually eligible PMAP enrollees found in our Control-In study group. Table 11 shows the distribution of enrollees by study group by place of residence.

Table 11
Number and Percentage of Enrollees by County of Residence and Study Group
January 1999

County Name	MSHO		Control-In		Control-Out	
	Number	Percent	Number	Percent	Number	Percent
Anoka	152	5.61	458	5.21		
Dakota	145	5.35	729	8.29		
Hennepin	1,957	72.24	4,224	48.05		
Ramsey	455	16.80	2,674	30.42		
Scott			258	2.94		
Washington			447	5.09		
Sherburne					290	11.67
St. Louis					1,607	64.64
Stearns					589	23.69

As seen in Table 12, the majority of enrollees in MSHO are enrolled into Medica, with UCare and Metropolitan Health Plan following in size respectively. While the PMAP enrollees are also served by health plans not participating in MSHO, Medica continues to have the largest number of enrollees.

Table 12
Number and Percentage of Enrollees by Health Plan and Study Group
January 1999

Health Plan	MSHO		Control-In		Control-Out	
	Number	Percent	Number	Percent	Number	Percent
Medica	1,821	67.22	4,087	46.50	1,852	74.50
Metro Health Plan	358	13.22	762	8.67	0	0.00
UCare	530	19.56	1,900	21.62	323	12.99
Other	0	0.00	2,041	23.22	311	12.51

As reported earlier, the majority of MSHO enrollees live in nursing homes. The number of MSHO enrollees living in nursing homes as a percentage of total enrollees is higher than for either in-area or out-of-area control groups. This higher percentage of nursing home enrollees is due in part to the large number of nursing home enrollees that rolled over from an earlier Medica managed care Medicare product (see Table 13). Of those individuals living in the community, the majority of them (78% of community enrollees in January 1999) are considered well or non-nursing home certifiable as measured by the rate cell category assigned to them. Again, level of care standards for MSHO enrollees determined to be nursing home certifiable are the same as for the State's fee-for-service population participating in the Elderly Waiver program. NHC status under MSHO triggers the Medicare frailty risk adjustment as well as an additional Medicaid capitation payment to cover needed home and community-based services. In January 1999, 12.39% of the community enrollees in our PMAP Control-In group were enrolled in the Elderly Waiver program and 30.90% of the Control-Out group (see Table 14).

Table 13
Number and Percentage of Enrollees by Place of Residence and Study Group
January 1999

	MSHO		Control-In		Control-Out	
	Number	Percent	Number	Percent	Number	Percent
Community	573	21.15	5,117	58.21	958	38.54
Nursing Home	2,136	78.85	3,673	41.79	1,528	61.46

Table 14
**Number and Percentage of Community Enrollees by Level of Care Needs
and Study Group
January 1999**

Level of Care Needs (Rate Cell Category, Elderly Waiver Status)	MSHO		Control-In		Control-Out	
Community (Rate Cell A)	449	78.36	4,483	87.61	662	69.10
Nursing Home Certifiable (Rate Cell B, eligible for Elderly Waiver)	121	21.12	634	12.39	296	30.90
Nursing Home Conversion (Rate Cell C)	3	0.52				

Disenrollment

As previously mentioned, disenrollment from MSHO has been between 40 - 50%, largely due to death. During our study period (March 1, 1997, to December 31, 2000), MSHO program had 3,486 disenrollments involving 3,410 enrollees. Because there was no specific indication of disenrollment provided in the DHS data, we defined MSHO disenrollment as being any individual being absent from the eligibility records for more than one month. The number of disenrollments is greater than the number of enrollees involved indicating that one enrollee may have multiple non-contiguous enrollment stays based on his or her MSHO eligibility records. In other words, one enrollee may have multiple disenrollments if he or she has non-continuous MSHO enrollment eligibility records. Of those 3,410 individuals who disenrolled between March 1997 and December 2000, the majority were nursing home residents and the majority disenrolled due to death. The majority of community disenrollees were alive at disenrollment.

Table 15 shows the number of MSHO enrollees that have disenrolled during our study period by status at disenrollment and subsequent enrollment (if available). Based upon the enrollment data provided by DHS, we tracked whether or not an individual who disenrolled from MSHO alive later reappeared in the enrollment files, either in PMAP or MSHO. We suspect that a disenrollment from MSHO and subsequent reenrollment into MSHO may indicate a gap in dual eligibility status or a true disenrollment from MSHO with a later reconsideration. In some cases, an individual disenrolled from MSHO but was never found again in the enrollment files. This may indicate that the individual moved out of the study area or permanently lost their dual eligibility status. We believe that disenrollment from MSHO with a subsequent enrollment into PMAP suggests a true voluntary disenrollment.

Table 15
Number of MSHO Disenrollments and Disenrollees Involved
by Status at Disenrollment and Subsequent Enrollment
(March 1, 1997, to December 30, 2000)

MSHO	Number of Disenrollments (Number of Enrollees Involved)		Subsequent Enrollments (Number of Enrollees Involved)		
Category	**Deceased**	**Alive**	**To PMAP**	**To MSHO**	**Neither**
Nursing Home	2,260 (2,260)	711 (670)	370 (361)	194 (181)	147 (147)
Community	82 (82)	433 (398)	204 (200)	115 (105)	114 (114)

Utilization – Cross Sectional Analysis

Inpatient Hospitalizations and Emergency Services

All of the utilization data is presented in a common format designed to provide as much information as possible which will allow the reader to make his or her own interpretations of the data. First we present the raw data comparing MSHO with the two controls. Then we present the results of the regression models that show the effects of applying adjustment. We show the regression coefficients that reflect the effect of MSHO compared to each control group under two conditions: 1) the unadjusted raw data, and 2) adjustments for both demographic/concurrent factors and prior utilization. Although substantially fewer cases were available for the second risk adjustment group (adjustments for both demographic/concurrent factors and prior utilization), the demographic and clinical characteristics of the larger and smaller groups were quite similar. However, this smaller sample size may influence the likelihood of statistical differences. The sign of the regression coefficient is positive when the control rate is greater than the MSHO rate and negative when it is less.

Table 16 addresses the community sample for inpatient hospitalizations and emergency services and Table 17 the nursing home sample. The unadjusted mean rates for various hospital-related events are expressed as the mean monthly rates per 100 persons. Figures 2-5 provide a graphical representation of the unadjusted mean rates for community and nursing home enrollees separately. Within the community sample, only the Control-In group had significantly fewer hospital admissions than the MSHO group and only without risk adjustment. In only three cases in Table 16 is the pattern of statistical significance consistent for both unadjusted and adjusted analyses. Hospital days is significantly higher, and length of stay for Control-Out enrollees is consistently significantly longer than that for MSHO enrollees and the number of Preventive ER services is consistently significantly greater for the Control-In group. The pattern of results for inpatient stays suggests that where the number of hospital days is different it is being influenced by the length of stay and not by the number of hospital admissions.

The pattern for the nursing home sample was quite different. In almost every instance the patterns were the same regardless of the nature of the adjustment. Hospital

admission rates were significantly higher for the Control-In group with or without adjustment and significant for the Control-Out group after adjustment. Number of hospital days per 100 enrollees was greater for the Control-In group. LOS, however, was not significantly different for either control group. This suggests that MSHO is having an impact on the number of hospital admissions and not the length of stay once admitted. Preventive hospitalization rates were higher for the Control-In group. ER visit rates and preventable ER visits rates were higher for both control groups.

Table 16
Utilization of Inpatient Hospital and Emergency Services
Unadjusted Mean Monthly Utilization Rates Per 100 Enrollees and
Comparison of MSHO to Controls for Community Sample

	MSHO	Control-In	Control-Out
Hospital Admissions			
-Unadjusted Mean Monthly Rates Per 100 Enrollees	4.27	3.84	4.21
-Regression Coefficients			
Raw		-0.091*	0.012
Demographic + Utilization Adjustment		0.095	0.043
Hospital Days			
-Unadjusted Mean Monthly Rates Per 100 Enrollees	21.90	20.54	24.61
-Regression Coefficients			
Raw		-0.006	0.036*
Demographic + Utilization Adjustment		0.045**	0.065***
Hospital Length of Stay			
-Unadjusted Mean Value	5.09	5.39	5.89
-Regression Coefficients			
Raw		0.321	0.825*
Demographic + Utilization Adjustment		0.852**	1.721***
Preventable Admissions			
-Unadjusted Mean Monthly Rates Per 100 Enrollees	0.82	0.84	0.95
-Regression Coefficients			
Raw		0.007	0.122
Demographic + Utilization Adjustment		0.106	0.006
Emergency Room Visits			
-Unadjusted Mean Monthly Rates Per 100 Enrollees	6.36	6.51	6.05
-Regression Coefficients			
Raw		0.001	-0.004
Demographic + Utilization Adjustment		0.003	-0.008*
Preventable ER Visits			
-Unadjusted Mean Monthly Rates Per 100 Enrollees	2.01	2.39	2.27
-Regression Coefficients			
Raw		0.003**	0.002
Demographic + Utilization Adjustment		0.004**	-0.000

Note: The N for the Raw group was 251,205 person months. The N for the Demographic and Utilization group was 116,013 person months.

*=p<.05, **=p<.01, ***=p≤.001

Table 17
Utilization of Inpatient Hospital and Emergency Services
Unadjusted Mean Monthly Utilization Rates Per 100 Enrollees and
Comparison of MSHO to Controls for Nursing Home Sample

	MSHO	Control-In	Control-Out
Hospital Admissions			
-Unadjusted Mean Monthly Rates Per 100 Enrollees	2.72	3.85	2.90
-Regression Coefficients			
Raw		0.352***	0.076
Demographic + Utilization Adjustment		0.276***	0.133*
Hospital Days			
-Unadjusted Mean Monthly Rates Per 100 Enrollees	14.78	21.73	14.13
-Regression Coefficients			
Raw		0.070***	-0.006
Demographic + Utilization Adjustment		0.056***	0.006
Hospital Length of Stay			
-Unadjusted Mean Value	5.42	5.68	4.89
-Regression Coefficients			
Raw		0.256	-0.533
Demographic + Utilization Adjustment		0.277	-0.441
Preventable Admissions			
-Unadjusted Mean Monthly Rates Per 100 Enrollees	0.51	0.75	0.49
-Regression Coefficients			
Raw		0.405***	-0.011
Demographic + Utilization Adjustment		0.304**	0.094
Emergency Room Visits			
-Unadjusted Mean Monthly Rates Per 100 Enrollees	3.78	5.90	4.58
-Regression Coefficients			
Raw		0.021***	0.008***
Demographic + Utilization Adjustment		0.017***	0.009***
Preventable ER Visits			
-Unadjusted Mean Monthly Rates Per 100 Enrollees	1.66	2.49	2.08
-Regression Coefficients			
Raw		0.009***	0.004***
Demographic + Utilization Adjustment		0.007***	0.005***

Note: The N for the Raw group was 261,204 person months. The N for the Demographic and Utilization group was 104,111 person months.

*=p<.05, **=p<.01, ***=p≤.001

Figure 2
Average Number of Inpatient Admissions per 100 Community Persons
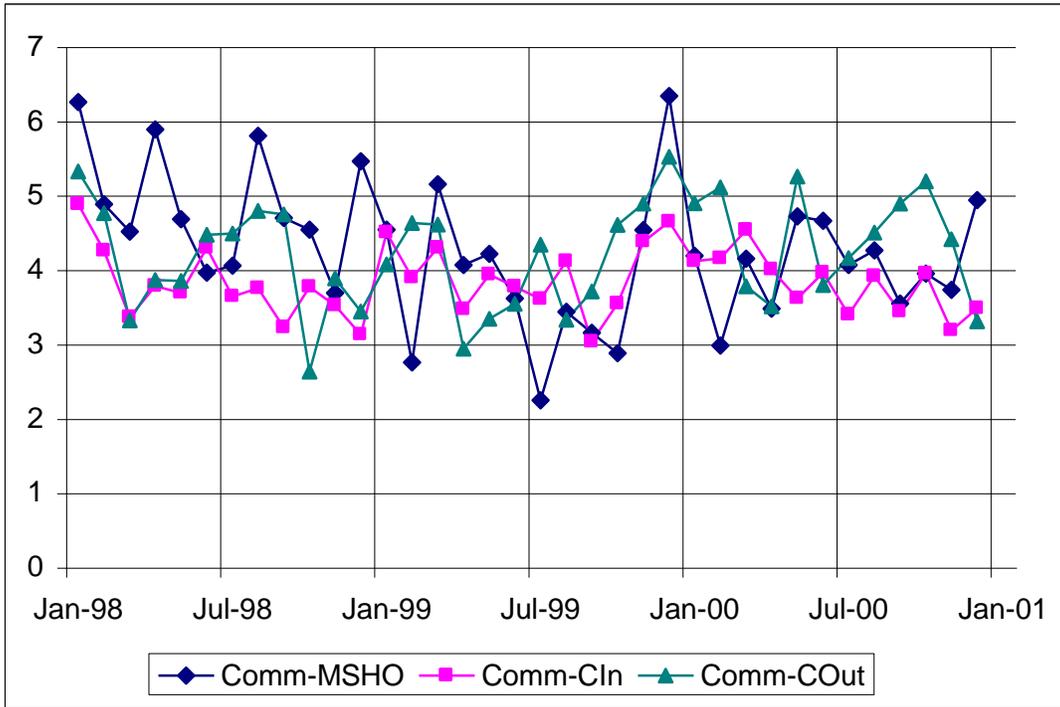
Figure 3
Average Number of Instances of Emergency Services per 100 Community Persons
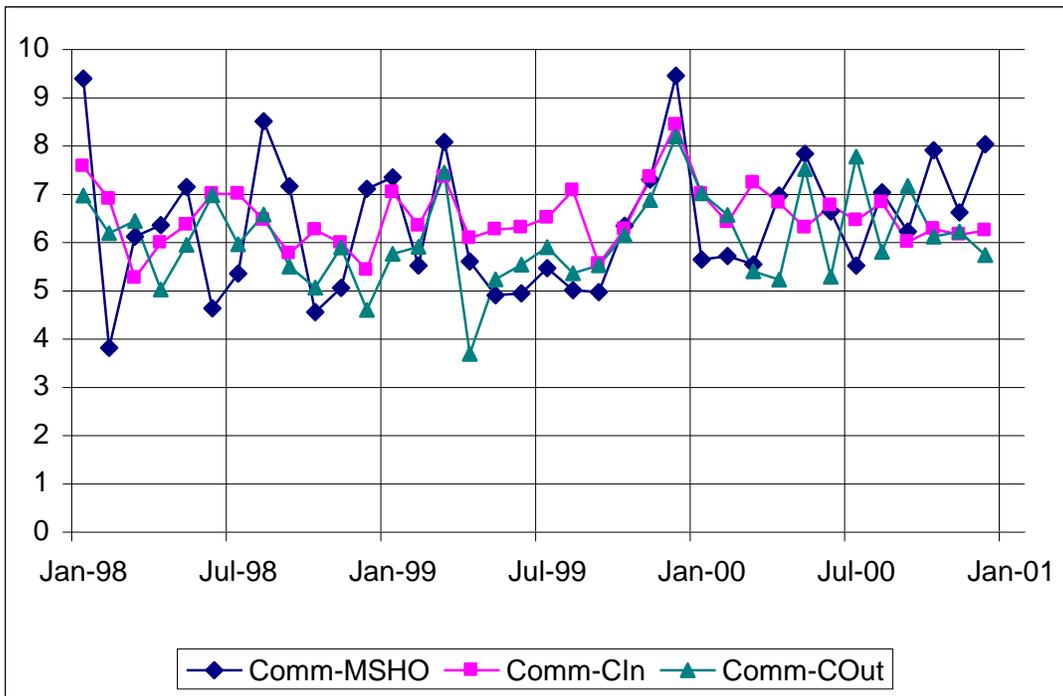
Figure 4
Average Number of Inpatient Admissions per 100 Nursing Home Persons
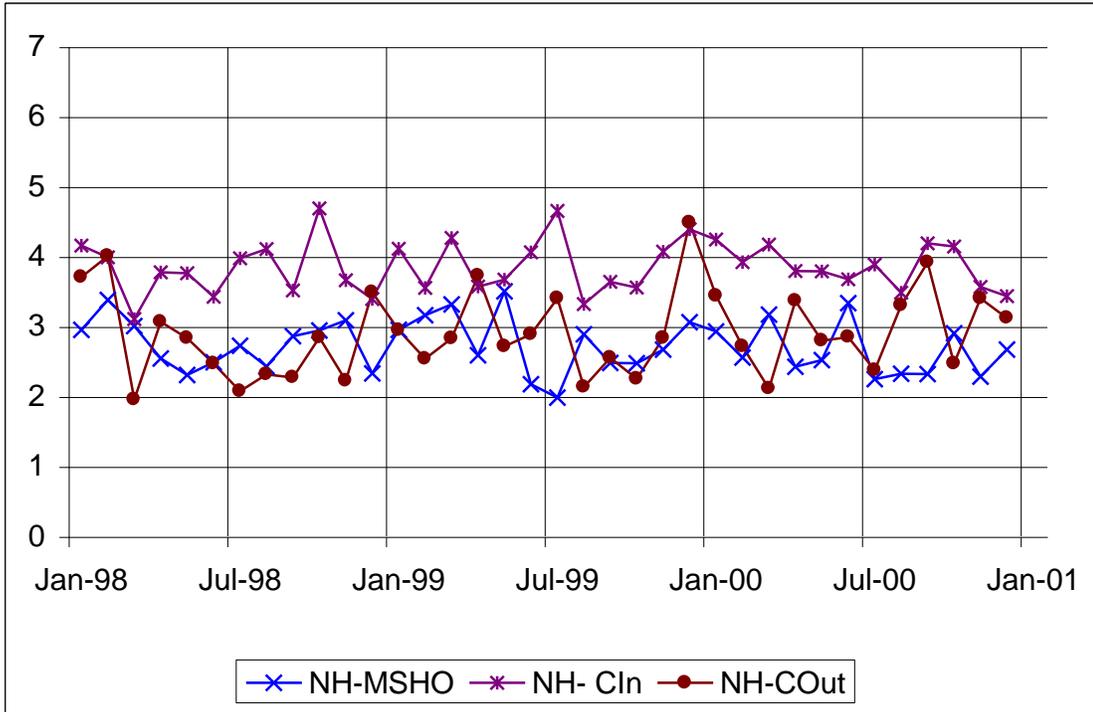
Figure 5
Average Number of Instances of Emergency Services per 100 Nursing Home Persons
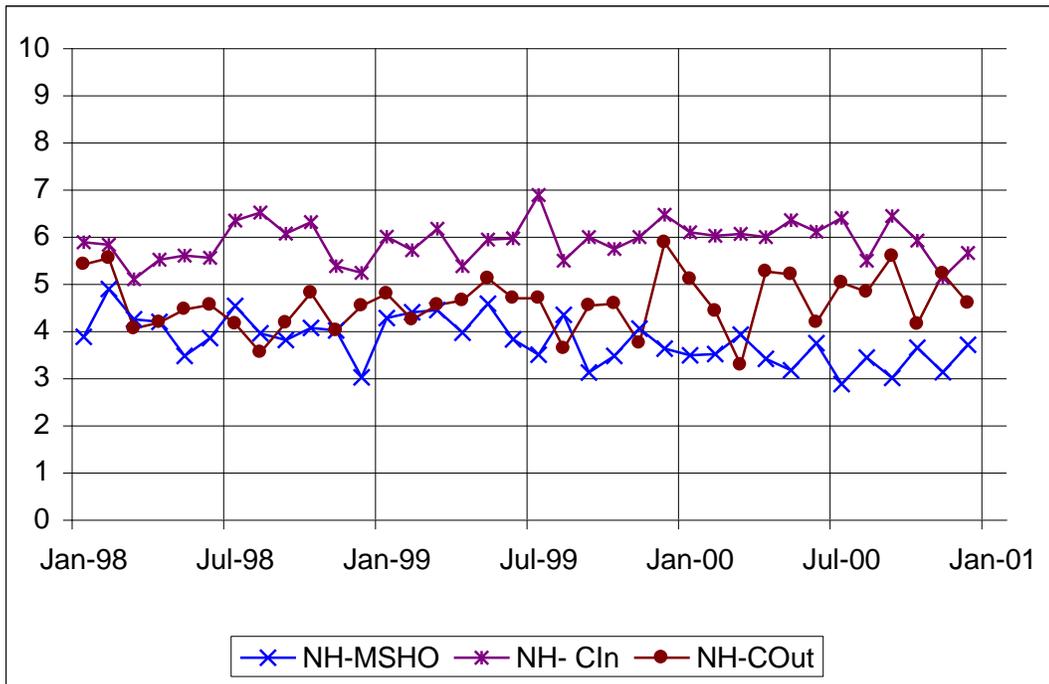
Provider Visits

Table 18 and Figures 6-8 compare the average number of in-person provider visits (by physicians and nurse practitioners) per month between MSHO and the control groups for community and nursing home residents. For both samples the control groups receive more visits than the MSHO groups. These differences are statistically significant with and without adjustment.

Table 18
Adjusted and Unadjusted Analyses of Differences in Face-to-Face Provider Visits
Comparison of MSHO to Controls for Community and Nursing Home Samples

	MSHO	Control-In	Control-Out
Community Sample†			
-Unadjusted Mean Monthly Rates Per 100 Enrollees	77.78	115.11	114.10
-Regression Coefficients			
Raw		0.400***	0.388***
Prior Utilization + Demographic		0.539***	0.349***
Nursing Home Sample‡			
-Unadjusted Mean Monthly Rates Per 100 Enrollees	83.59	135.04	145.35
-Regression Coefficients			
Raw		0.513***	0.617***
Prior Utilization + Demographic		0.553***	0.630***

Note: † In the Community Sample, the N for the Raw group was 251,205 person months. The N for the Demographic and Utilization group was 116,013 person months.

    ‡ In the Nursing Home Sample, the N for the Raw group was 261,204 person months. The N for the Demographic and Utilization group was 104,111 person months.

*=p<.05, **=p<.01, ***=p≤.001

Figure 6
Average Number of Face-to-Face Physician or NP Visits per 100 Persons
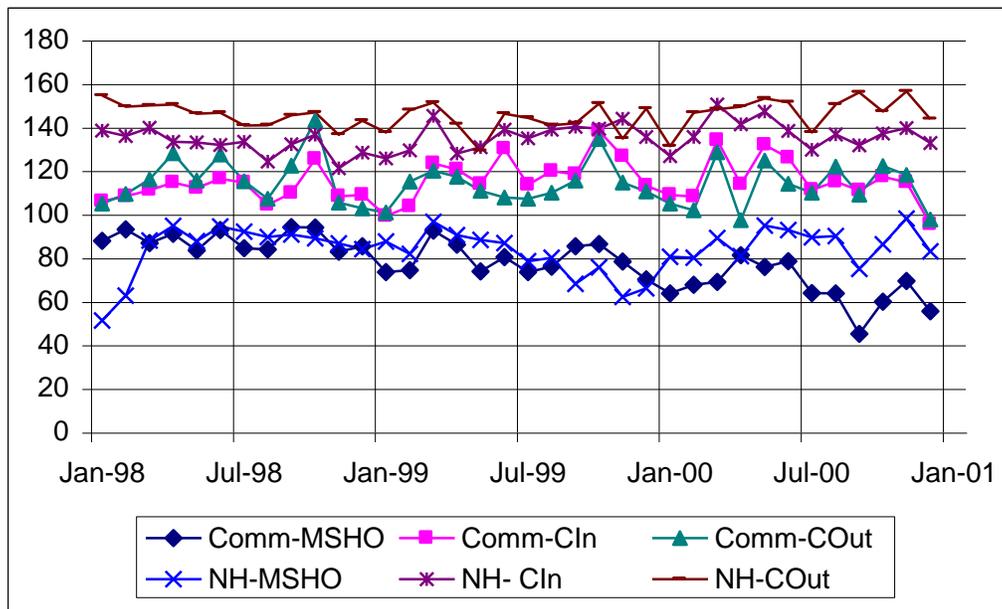
Figure 7
Average Number of Face-to-Face Physician or NP Visits per 100 Community Persons
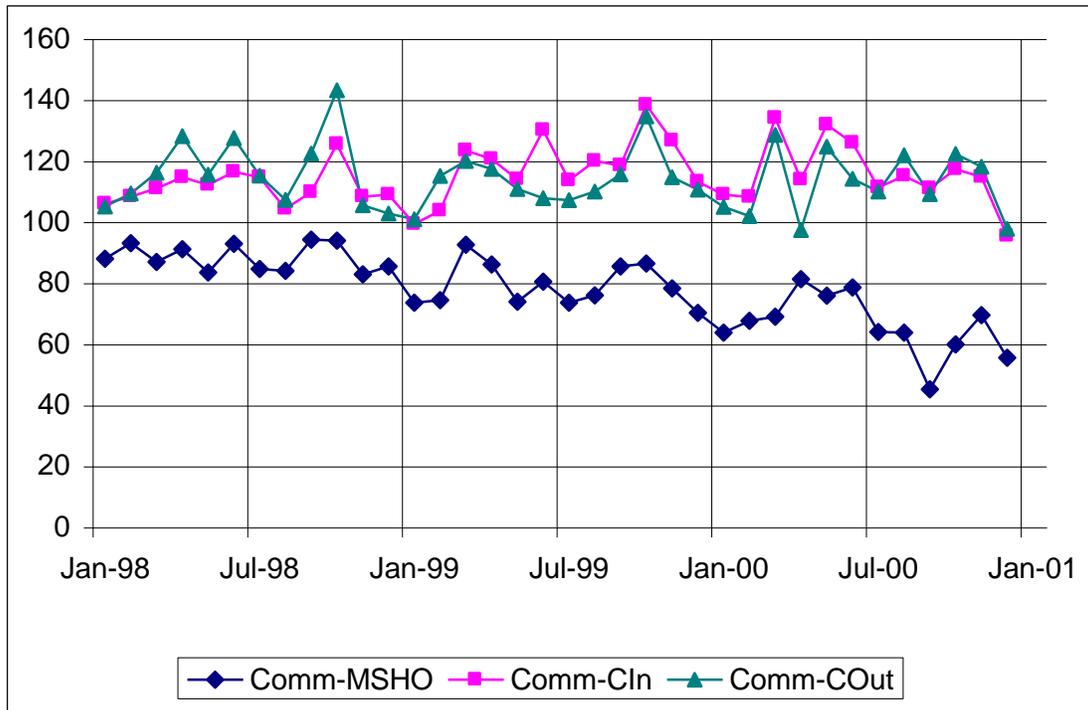
Figure 8
Average Number of Face-to-Face Physician or NP Visits per 100 Nursing Home Persons
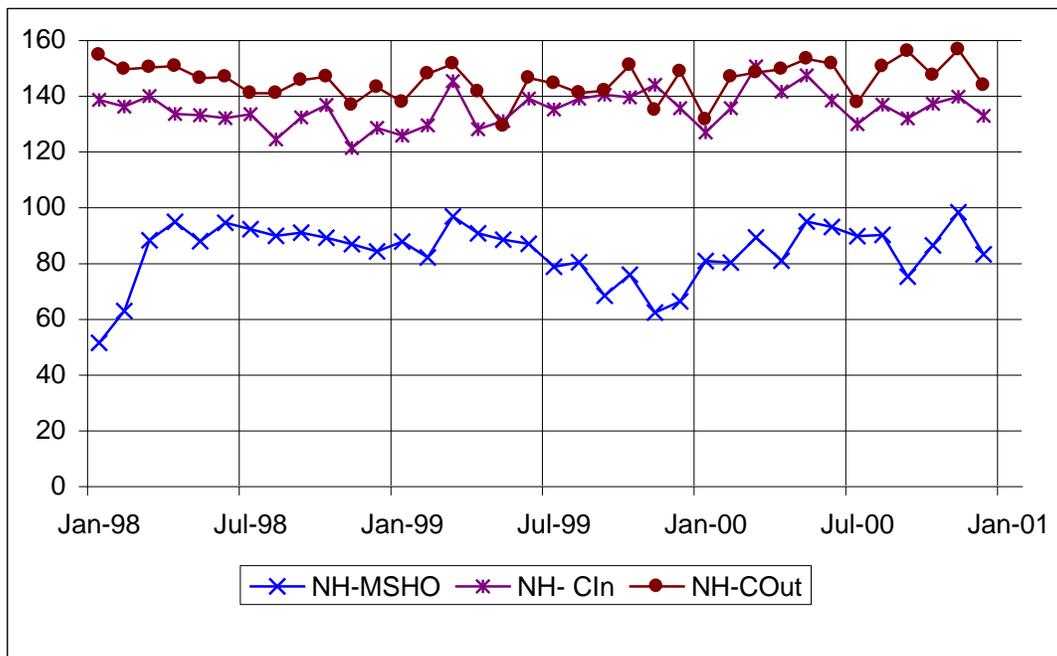
However, when the question is posed slightly differently, in terms of what proportion of each group received in-person provider services, the pattern changes dramatically. Table 19 shows the mean values and the statistical significance. For the community sample, slightly more MSHO clients are seen each month. This difference is significant for the Control-In group without adjustment and with risk adjustment for demographics and prior utilization although the significance changes direction. The difference between MSHO community enrollees and the Control-Out group is only significant with adjustment for demographic and prior utilization. For the nursing home sample, where contact is mandatory, the patterns are almost the same across the groups but the larger numbers included mean that the slightly fewer MSHO clients seen are statistically significant. However, it should be noted that some nurse practitioner visits provided by MSHO care systems may be under reported in the encounter data files submitted to DHS.

Table 19
Adjusted and Unadjusted Analyses of Differences in Rates of Persons
Receiving Any Face-to-Face Provider Visits
Comparison of MSHO to Controls for Community and Nursing Home Samples

	MSHO	Control-In	Control-Out
Community Sample†			
-Unadjusted Mean Monthly Rates Per 100 Enrollees	40.58	38.72	39.29
-Regression Coefficients			
Raw		-0.049***	-0.025
Prior Utilization + Demographic		0.079***	-0.077**
Nursing Home Sample‡			
-Unadjusted Mean Monthly Rates Per 100 Enrollees	57.60	58.43	62.64
-Regression Coefficients			
Raw		0.032***	0.209***
Prior Utilization + Demographic		0.019	-0.190***

Note: † In the Community Sample, the N for the Raw group was 251,205 person months. The N for the Demographic and Utilization group was 116,013 person months.
‡ In the Nursing Home Sample, the N for the Raw group was 261,204 person months. The N for the Demographic and Utilization group was 104,111 person months.
*=p<.05, **=p<.01, ***=p≤.001

Preventive Services

The mean rates and statistical analyses for the community sample of preventive services are shown in Table 20. With regard to immunizations, MSHO clients receive more pneumococcal and influenza immunizations than the Control-In group and more influenza immunizations than the Control-Out group. With regard to screening tests, MSHO clients show higher rates for pap smears without adjustment, and occult blood tests, and prostate cancer screening with or without adjustment. The patterns of difference are stronger compared to the Control-In group than to the Control-Out group. Among nursing home residents, shown in Table 21, the patterns of difference are more complex. MSHO residents are less likely to receive pneumococcal vaccine but more likely to receive influenza immunization. With regard to screening tests, MSHO residents are

more likely than either group of controls to have a pap smear, a test for prostate cancer, and a glaucoma test, but less likely than the Control-In group to receive a mammogram. In the case of a fecal occult blood test, MSHO residents are more likely to receive one than the Control-In group but less likely than Control-Out group although this does not remain significant after adjustment. It should be noted that preventive services may be provided only as needed, in some cases only once per lifetime, such as pneumococcal vaccines or on a schedule defined by Medicare coverage.

Table 20
Adjusted and Unadjusted Analyses of Differences in Preventive Services
Comparison of MSHO to Controls for Community Sample

	MSHO	Control-In	Control-Out
Immunizations			
Pneumococcal †			
-Unadjusted Mean Monthly Rates Per 100 Enrollees	0.76	0.51	0.63
-Regression Coefficients			
Raw		-0.442***	-0.237*
Prior Utilization + Demographic		-0.353**	0.011
Hepatitis B †			
-Unadjusted Mean Monthly Rates Per 100 Enrollees	0.06	0.06	0.04
-Regression Coefficients			
Raw		-0.003	-0.377
Prior Utilization + Demographic		0.245	-0.405
Influenza †			
-Unadjusted Mean Monthly Rates Per 100 Enrollees	3.65	2.68	3.36
-Regression Coefficients			
Raw		-0.383***	-0.155***
Prior Utilization + Demographic		-0.341***	-0.254***
Screening Services			
Pap Smear ‡	**women**		
-Unadjusted Mean Monthly Rates Per 100 Enrollees	1.33	0.90	0.89
-Regression Coefficients			
Raw		-0.376***	-0.360
Prior Utilization + Demographic		-0.164	-0.036
Mammography ‡	**women**		
-Unadjusted Mean Monthly Rates Per 100 Enrollees	2.61	2.33	2.62
-Regression Coefficients			
Raw		-0.098	0.024
Demographic		-0.111*	-0.039
Prior Utilization + Demographic		-0.105	-0.015
Pelvic Exam ‡	**women**		
-Unadjusted Mean Monthly Rates Per 100 Enrollees	0.02	0.11	0.05
-Regression Coefficients			
Raw		1.597**	0.838
Prior Utilization + Demographic		1.519**	0.317

	MSHO	Control-In	Control-Out
Fecal-Occult Blood Test †			
-Unadjusted Mean Monthly Rates Per 100 Enrollees	1.00	0.60	0.64
-Regression Coefficients			
Raw		-0.483***	-0.424***
Prior Utilization + Demographic		-0.451***	-0.418**
Sigmoidoscopy †			
-Unadjusted Mean Monthly Rates Per 100 Enrollees	0.30	0.29	0.23
-Regression Coefficients			
Raw		-0.003	-0.233
Prior Utilization + Demographic		-0.086	-0.721*
Barium Enema †			
-Unadjusted Mean Monthly Rates Per 100 Enrollees	0.15	0.16	0.23
-Regression Coefficients			
Raw		0.089	0.458*
Prior Utilization + Demographic		-0.034	-0.001
Colonoscopy †			
-Unadjusted Mean Monthly Rates Per 100 Enrollees	0.34	0.40	0.47
-Regression Coefficients			
Raw		0.145	0.295*
Prior Utilization + Demographic		0.137	0.150
Bone Mass Measurement ‡	**women**		
-Unadjusted Mean Monthly Rates Per 100 Enrollees	0.28	0.26	0.29
-Regression Coefficients			
Raw		0.009	0.079
Prior Utilization + Demographic		0.196	0.046
PSA/Digital Rectal Exam §	**men**		
-Unadjusted Mean Monthly Rates Per 100 Enrollees	1.84	1.13	1.70
-Regression Coefficients			
Raw		-0.447***	-0.050
Prior Utilization + Demographic		-0.397**	-0.256
Glaucoma Screening †			
-Unadjusted Mean Monthly Rates Per 100 Enrollees	2.99	2.91	3.04
-Regression Coefficients			
Raw		-0.005	0.037
Prior Utilization + Demographic		0.030	-0.046

Note: † The N for the Raw group was 251,205 person months. The N for the Demographic and Utilization group was 116,013 person months.

‡ The N for the Raw group for women was 182,698 person months. The N for the Demographic and Utilization group for women was 85,836 person months.

§ The N for the Raw group for men was 68,507 person months. The N for the Demographic and Utilization group for men was 30,177 person months.

*=p<.05, **=p<.01, ***=p≤.001

Table 21
Adjusted and Unadjusted Analyses of Differences in Preventive Services
Comparison of MSHO to Controls for Nursing Home Sample

	MSHO	Control-In	Control-Out
Immunizations			
Pneumococcal †			
-Unadjusted Mean Monthly Rates Per 100 Enrollees	0.02	0.04	0.18
-Regression Coefficients			
Raw		0.614*	2.174***
Prior Utilization + Demographic		0.794	2.315***
Hepatitis B †			
-Unadjusted Mean Monthly Rates Per 100 Enrollees	0.00	0.00	0.01
-Regression Coefficients			
Raw		7.089	7.382
Prior Utilization + Demographic		4.847	3.558
Influenza †			
-Unadjusted Mean Monthly Rates Per 100 Enrollees	0.86	0.27	0.37
-Regression Coefficients			
Raw		-1.279***	-0.894***
Prior Utilization + Demographic		-1.356***	-1.037***
Screening Services			
Pap Smear ‡	**women**		
-Unadjusted Mean Monthly Rates Per 100 Enrollees	1.74	0.48	0.42
-Regression Coefficients			
Raw		-1.324***	-1.438***
Prior Utilization + Demographic		-1.290***	-1.238***
Mammography ‡	**women**		
-Unadjusted Mean Monthly Rates Per 100 Enrollees	0.35	0.52	0.34
-Regression Coefficients			
Raw		0.381***	-0.038
Prior Utilization + Demographic		0.284*	0.047
Pelvic Exam ‡	**women**		
-Unadjusted Mean Monthly Rates Per 100 Enrollees	0.00	0.01	0.00
-Regression Coefficients			
Raw		1.504*	0.423
Demographic		1.169	0.445
Prior Utilization + Demographic		0.178	-8.641
Fecal-Occult Blood Test †			
-Unadjusted Mean Monthly Rates Per 100 Enrollees	0.12	0.06	0.25
-Regression Coefficients			
Raw		-0.652***	0.717***
Prior Utilization + Demographic		-1.166***	0.340
Sigmoidoscopy †			
-Unadjusted Mean Monthly Rates Per 100 Enrollees	0.06	0.10	0.07
-Regression Coefficients			
Raw		0.546***	0.167
Prior Utilization + Demographic		0.449	0.053

	MSHO	Control-In	Control-Out
Barium Enema †			
-Unadjusted Mean Monthly Rates Per 100 Enrollees	0.10	0.15	0.12
-Regression Coefficients			
Raw		0.335*	0.136
Prior Utilization + Demographic		0.300	0.002
Colonoscopy †			
-Unadjusted Mean Monthly Rates Per 100 Enrollees	0.11	0.15	0.17
-Regression Coefficients			
Raw		0.263*	0.401**
Prior Utilization + Demographic		0.176	0.306
Bone Mass Measurement ‡	**women**		
-Unadjusted Mean Monthly Rates Per 100 Enrollees	0.02	0.04	0.03
-Regression Coefficients			
Raw		0.730*	0.256
Prior Utilization + Demographic		0.357	0.634
PSA/Digital Rectal Exam §	**men**		
-Unadjusted Mean Monthly Rates Per 100 Enrollees	0.82	0.33	0.31
-Regression Coefficients			
Raw		-0.944***	-0.989***
Prior Utilization + Demographic		-1.140***	-0.933***
Glaucoma Screening †			
-Unadjusted Mean Monthly Rates Per 100 Enrollees	3.38	3.24	1.96
-Regression Coefficients			
Raw		-0.053*	-0.566***
Prior Utilization + Demographic		-0.082*	-0.655***

Note: † The N for the Raw group was 261,204 person months. The N for the Demographic and Utilization group was 104,111 person months.

‡ The N for the Raw group for women was 202,078 person months. The N for the Demographic and Utilization group for women was 82,409 person months.

§ The N for the Raw group for men was 59,126 person months. The N for the Demographic and Utilization group for men was 21,702 person months.

*=p<.05, **=p<.01, ***=p≤.001

Therapy, Laboratory, and X-ray Services

The rate of receipt of outpatient therapy, laboratory, and x-ray services was assessed in two ways: We calculated the proportion of clients who received any therapy or laboratory service and the average number of days of therapy. (A parallel calculation for laboratory services does not make sense.) Table 22 provides the mean values and the significance of the differences between MSHO and the two control groups for the community samples and Table 23 provides the same information for the nursing home samples. As shown in Table 22, for community clients, the rates of therapy services are higher for MSHO but the rates of lab and x-ray are generally lower. Almost all these differences are significant. The pattern for nursing home residents is different. MSHO clients receive fewer therapy services and generally fewer lab and x-ray services with one exception: MSHO clients were more likely to receive cardiac stress testing.

Table 22
Comparison of MSHO Use of Laboratory Tests, X-rays, and Therapies to Controls for Community Sample

	MSHO	Control-In	Control-Out
Outpatient Physical Therapy, Occupational Therapy, and Speech Therapy			
Persons with any PT, OT, ST Visit			
-Unadjusted mean monthly rates per 100 enrollees	4.30	3.04	2.83
-Regression Coefficients			
Raw		-0.325***	-0.401***
Prior Utilization + Demographic		-0.106*	-0.457***
Number of days of PT, OT, ST in month			
-Unadjusted mean monthly rates per 100 enrollees	14.45	10.13	10.66
-Regression Coefficients			
Raw		0.140***	-0.037***
Prior Utilization + Demographic		-0.003	-0.033***
Outpatient Laboratory Services			
Persons with any Lab Work			
-Unadjusted mean monthly rates per 100 enrollees	24.36	26.85	29.69
-Regression Coefficients			
Raw		0.166***	0.305***
Prior Utilization + Demographic		0.364***	0.295***
Persons with ECG testing			
-Unadjusted mean monthly rates per 100 enrollees	2.25	3.36	3.24
-Regression Coefficients			
Raw		0.444***	0.401***
Prior Utilization + Demographic		0.572***	0.337***
Persons receiving Stress testing			
-Unadjusted mean monthly rates per 100 enrollees	0.27	0.45	0.27
-Regression Coefficients			
Raw		0.555***	0.054
Demographic		0.583***	-0.001
Prior Utilization + Demographic		0.657***	-0.106
Persons receiving EKG monitoring			
-Unadjusted mean monthly rates per 100 enrollees	0.16	0.21	0.25
-Regression Coefficients			
Raw		0.326	0.487*
Prior Utilization + Demographic		0.352	0.130
Outpatient Diagnostic Radiology Services			
Persons receiving any outpatient radiology services			
-Unadjusted mean monthly rates per 100 enrollees	4.13	10.42	11.57
-Regression Coefficients			
Raw		1.039***	1.157***
Prior Utilization + Demographic		1.277***	1.228***
Persons receiving Cat Scans			

	MSHO	Control-In	Control-Out
-Unadjusted mean monthly rates per 100 enrollees	0.52	1.21	1.06
-Regression Coefficients			
Raw		0.823***	0.688***
Prior Utilization + Demographic		0.966***	0.714***
Persons receiving MRI			
-Unadjusted mean monthly rates per 100 enrollees	0.27	0.52	0.37
-Regression Coefficients			
Raw		0.696***	0.355*
Prior Utilization + Demographic		0.739***	0.116
Persons receiving nuclear medicine			
-Unadjusted mean monthly rates per 100 enrollees	0.11	0.44	0.40
-Regression Coefficients			
Raw		1.381***	1.288***
Prior Utilization + Demographic		1.321***	0.939***
Persons receiving chest imaging			
-Unadjusted mean monthly rates per 100 enrollees	1.42	3.61	4.36
-Regression Coefficients			
Raw		0.973***	1.168***
Prior Utilization + Demographic		1.160***	1.242***
Persons receiving musculo-skeletal imaging			
-Unadjusted mean monthly rates per 100 enrollees	1.18	3.27	4.05
-Regression Coefficients			
Raw		1.099***	1.319***
Prior Utilization + Demographic		1.386***	1.380***
Persons receiving transportation of x-ray equipment			
-Unadjusted mean monthly rates per 100 enrollees	0.21	0.21	0.06
-Regression Coefficients			
Raw		0.010	-1.195***
Prior Utilization + Demographic		-0.165	-2.207***

Note: The N for the Raw group was 251,205 person months. The N for the Demographic and Utilization group was 116,013 person months.

*=$p<.05$, **=$p<.01$, ***=$p \leq .001$

Table 23
Comparison of MSHO use of Laboratory Tests, X-rays and Therapies to Controls for Nursing Home Sample

	MSHO	Control-In	Control-Out
Outpatient Physical Therapy, Occupational Therapy, and Speech Therapy			
Persons with any PT, OT, ST visit			
-Unadjusted mean monthly rates per 100 enrollees	7.04	9.84	9.20
-Regression Coefficients			
Raw		0.382***	0.299***
Prior Utilization + Demographic		0.338***	0.266***
Number of days of PT, OT, ST			
-Unadjusted mean monthly rates per 100 enrollees	30.58	57.69	54.87
-Regression Coefficients			
Raw		0.277***	0.249***
Prior Utilization + Demographic		0.347***	0.278***
Outpatient Laboratory Services			
Persons with any lab work			
-Unadjusted mean monthly rates per 100 enrollees	16.69	42.99	44.48
-Regression Coefficients			
Raw		1.334***	1.395***
Prior Utilization + Demographic		1.362***	1.462***
Persons with ECG testing			
-Unadjusted mean monthly rates per 100 enrollees	0.78	1.76	1.47
-Regression Coefficients			
Raw		0.846***	0.666***
Prior Utilization + Demographic		0.963***	0.789***
Persons receiving Stress testing			
-Unadjusted mean monthly rates per 100 enrollees	0.09	0.03	0.03
-Regression Coefficients			
Raw		-1.111***	-1.182***
Demographic		-1.168***	-1.133***
Prior Utilization + Demographic		-1.001**	-1.943***
Persons receiving EKG monitoring			
-Unadjusted mean monthly rates per 100 enrollees	0.11	0.32	0.15
-Regression Coefficients			
Raw		1.146***	0.316*
Prior Utilization + Demographic		1.146***	0.507
Outpatient Diagnostic Radiology Services			
Persons receiving any outpatient radiology services			
-Unadjusted mean monthly rates per 100 enrollees	5.86	12.74	9.23
-Regression Coefficients			
Raw		0.860***	0.500***
Prior Utilization + Demographic		0.930***	0.563***
Persons receiving Cat Scans			

	MSHO	Control-In	Control-Out
-Unadjusted mean monthly rates per 100 enrollees	0.47	0.85	0.74
-Regression Coefficients			
Raw		0.582***	0.451***
Prior Utilization + Demographic		0.643***	0.638***
Persons receiving MRI			
-Unadjusted mean monthly rates per 100 enrollees	0.04	0.09	0.11
-Regression Coefficients			
Raw		0.867***	1.062***
Prior Utilization + Demographic		0.636	0.606
Persons receiving nuclear medicine			
-Unadjusted mean monthly rates per 100 enrollees	0.05	0.11	0.10
-Regression Coefficients			
Raw		0.784***	0.738***
Prior Utilization + Demographic		0.408	0.444
Persons receiving Chest Imaging			
-Unadjusted mean monthly rates per 100 enrollees	2.96	7.25	4.44
-Regression Coefficients			
Raw		0.939***	0.420***
Prior Utilization + Demographic		0.996***	0.453***
Persons receiving Musculo-skeletal imaging			
-Unadjusted mean monthly rates per 100 enrollees	1.63	4.42	3.72
-Regression Coefficients			
Raw		1.035***	0.856***
Prior Utilization + Demographic		1.091***	0.873***
Persons receiving transportation of x-ray equipment			
-Unadjusted mean monthly rates per 100 enrollees	2.08	8.21	2.13
-Regression Coefficients			
Raw		1.448***	0.036
Prior Utilization + Demographic		1.577***	0.126*

Note: The N for the Raw group was 261,204 person months. The N for the Demographic and Utilization group was 104,111 person months.

*=p<.05, **=p<.01, ***=p≤.001

Mental Health Services

The data on mental health services utilization required substantial ordering. There are a number of different levels of variables available to classify services. The nature of the problem could be recorded as relating to any mental health service or specific to mental illness or dementia. (Unknown was an option for each category.) The type of service was either psychiatric or evaluation and management. Providers could be physicians or non-physicians (psychologists, social workers, or nurses). The services are reported in terms of the proportion of clients using each in a month and the average number of services provided per 100 clients. A vast number of analyses can be done with all these combinations. Here we highlight the most salient ones.

The first series of tables describes the care for community residents. As seen in Table 24, Control-In and Control-Out community residents received more mental health attention overall than did MSHO clients, expressed either as numbers of services received or persons served. Table 25 shows that both control groups received more overall psychological services for a mental illness diagnosis than the MSHO group. These psychological services could be provided by either a physician or a clinical trained non-physician such as a psychologist. Both control groups received significantly more physician attention than did MSHO clients for psychological care of a mental illness diagnosis (Table 26). As shown in Table 27, both control groups received more evaluation and management attention for a mental illness diagnosis than MSHO, but the difference compared to the Control-Out group did not remain significant after adjustment. When the analysis is restricted to just physician care during evaluation and management visits for a diagnosis of mental illness, both control groups received more services (Table 28). Care for persons with dementia (either through psychological services or evaluation and management visits provided by either physicians or non-physicians) was greater for the Control-In group than for MSHO clients (Table 29). The difference between MSHO and the Control-Out group was not significant. This same pattern held for treatment and evaluation services for dementia, as shown in Table 30. The number of persons receiving physician evaluation and management visits for dementia was less for controls, as shown in Table 31; these latter differences were not always statistically significant. The number of visits per 100 persons receiving physician evaluation and management services for dementia was not significant compared to either control group.

Among nursing home residents, the general pattern of services shown in Table 32 suggested that the control groups received more mental health attention in general for any mental health diagnosis provided by any type of provider. For psychological services provided for a mental illness diagnosis by either a physician or a non-physician the pattern, shown in Table 33, the results are more mixed. The percentage of persons receiving care was higher among Control-In residents than MSHO residents. The numbers of services received was greater for both the control groups than for MSHO residents. This same pattern holds when psychological services provided by a physician are specifically examined in Table 34 except that the number of persons served is significant less for the Control-Out group. The rate of evaluation and management services provided for mental illness was consistently higher for controls than MSHO (Table 35), and the same pattern held for evaluation and management services provided by a physician for a mental illness diagnosis (Table 36). With regard to dementia care (Table 37), fewer persons in the control groups were served compared to MSHO but the number of services received was greater for the Control-Out group compared to MSHO residents. Again, as shown in Table 38, the evaluation and management rates for persons served for the treatment of dementia were higher for MSHO residents than either control group, but the overall number of services received for this purpose was higher for the Control-Out group than for MSHO enrollees. When the analysis was restricted to only physician evaluation and management care for dementia (Table 39), more MSHO residents than either control group received care, but the rate of visits for MSHO residents was lower than the Control-Out group.

Table 24
Use of Any Mental Health Services For Any Mental Health Diagnosis Provided By Any Type of Provider by MSHO Community Residents Compared to Controls

	MSHO	Control-In	Control-Out
Persons Served			
-Unadjusted mean monthly rates per 100 enrollees	3.67	5.14	5.58
-Regression Coefficients			
Raw		0.336***	0.424***
Prior Utilization + Demographic		0.451***	0.192**
Number of Services Received			
-Unadjusted mean monthly rates per 100 enrollees	6.46	10.43	12.04
-Regression Coefficients			
Raw		0.038***	0.054***
Prior Utilization + Demographic		0.040***	0.013*

*=p<.05, **=p<.01, ***=p≤.001

Includes psychological and evaluation and management visits provided by either a physician or a clinical trained non-physician such as a psychologist

Table 25
Use of Psychological Service Visits with a Mental Illness Diagnosis Provided by Either a Physician or a Non-physician by MSHO Community Residents Compared to Controls

	MSHO	Control-In	Control-Out
Persons Served			
-Unadjusted mean monthly rates per 100 enrollees	1.99	2.46	3.11
-Regression Coefficients			
Raw		0.193***	0.438***
Prior Utilization + Demographic		0.315***	0.302***
Number of Services Received			
-Unadjusted mean monthly rates per 100 enrollees	3.70	5.28	7.37
-Regression Coefficients			
Raw		0.014***	0.035***
Prior Utilization + Demographic		0.017***	0.017***

*=p<.05, **=p<.01, ***=p≤.001

Psychological services may be performed by either a physician or a clinical trained non-physician such as a psychologist

Table 26
Use of Physician Services for Psychological Treatment of Mental Illness by MSHO Community Residents Compared to Controls

	MSHO	Control-In	Control-Out
Persons Served			
-Unadjusted mean monthly rates per 100 enrollees	1.18	1.93	2.73
-Regression Coefficients			
Raw		0.517***	0.878***
Prior Utilization + Demographic		0.530***	0.595***
Number of Services Received			
-Unadjusted mean monthly rates per 100 enrollees	1.48	3.40	5.65
-Regression Coefficients			
Raw		0.019***	0.041***
Prior Utilization + Demographic		0.015***	0.028***

*=p<.05, **=p<.01, ***=p≤.001

Table 27
Use of Evaluation and Management Service Visits for the Treatment of Mental Illness Provided by Either a Physician or a Non-physician By MSHO Community Residents Compared to Controls

	MSHO	Control-In	Control-Out
Persons Served			
-Unadjusted mean monthly rates per 100 enrollees	1.21	1.86	1.66
-Regression Coefficients			
Raw		0.457***	0.339***
Prior Utilization + Demographic		0.682***	0.027
Number of Services Received			
-Unadjusted mean monthly rates per 100 enrollees	1.45	3.50	2.99
-Regression Coefficients			
Raw		0.014***	0.021***
Prior Utilization + Demographic		0.023***	-0.004

*=p<.05, **=p<.01, ***=p≤.001

Evaluation and management services may be performed by either a physician or a clinical trained nonphysician such as a psychologist

Table 28
Use of Physician Services for Evaluation and Management of Visits for the Treatment of Mental Illness by MSHO Community Residents Compared to Controls

	MSHO	Control-In	Control-Out
Persons Served			
-Unadjusted mean monthly rates per 100 enrollees	0.65	0.84	1.13
-Regression Coefficients			
Raw		0.248**	0.551***
Prior Utilization + Demographic		0.352**	0.363*
Number of Services Received			
-Unadjusted mean monthly rates per 100 enrollees	0.83	1.53	2.23
-Regression Coefficients			
Raw		0.007***	0.014***
Prior Utilization + Demographic		0.008***	0.009***

*=p<.05, **=p<.01, ***=p≤.001

Table 29
Rates of Treatment for Dementia by MSHO Community Residents Compared to Controls

	MSHO	Control-In	Control-Out
Persons Served			
-Unadjusted mean monthly rates per 100 enrollees	0.28	0.52	0.29
-Regression Coefficients			
Raw		0.548***	-0.032
Prior Utilization + Demographic		1.196***	0.076
Number of Services Received			
-Unadjusted mean monthly rates per 100 enrollees	0.39	0.69	0.46
-Regression Coefficients			
Raw		0.004***	0.003***
Prior Utilization + Demographic		0.007***	0.001

*=p<.05, **=p<.01, ***=p≤.001

Includes psychological and evaluation and management visits for dementia care provided by physicians or a clinical trained non-physician such as a psychologist

Table 30
Rates of Evaluation and Management Visits for the Treatment of Dementia by MSHO Community Residents Compared to Controls

	MSHO	Control-In	Control-Out
Persons Served			
-Unadjusted mean monthly rates per 100 enrollees	0.28	0.48	0.23
-Regression Coefficients			
Raw		0.467***	-0.251
Prior Utilization + Demographic		1.138***	-0.088
Number of Services Received			
-Unadjusted mean monthly rates per 100 enrollees	0.39	0.62	0.33
-Regression Coefficients			
Raw		0.002**	-0.001
Prior Utilization + Demographic		0.006***	0.001

*=p<.05, **=p<.01, ***=p≤.001

Evaluation and management services may be performed by either a physician or a clinical trained non-physician such as a psychologist

Table 31
Rates of Physician Evaluation and Management Visits for Dementia by MSHO Community Residents Compared to Controls

	MSHO	Control-In	Control-Out
Persons Served			
-Unadjusted mean monthly rates per 100 enrollees	0.20	0.13	0.13
-Regression Coefficients			
Raw		-0.442**	-0.469*
Prior Utilization + Demographic		-0.007	-0.302
Number of Services Received			
-Unadjusted mean monthly rates per 100 enrollees	0.31	0.23	0.22
-Regression Coefficients			
Raw		-0.001	-0.001
Prior Utilization + Demographic		0.001	0.000

*=p<.05, **=p<.01, ***=p≤.001

Table 32
Use of Any Mental Health Services for Any Mental Health Diagnosis Provided by Any Type of Provider by MSHO Nursing Home Residents Compared to Controls

	MSHO	Control-In	Control-Out
Persons Served			
-Unadjusted mean monthly rates per 100 enrollees	13.03	15.01	15.72
-Regression Coefficients			
Raw		0.155***	0.207***
Prior Utilization + Demographic		0.419***	0.333***
Number of Services Received			
-Unadjusted mean monthly rates per 100 enrollees	16.13	30.11	29.92
-Regression Coefficients			
Raw		0.138***	0.136***
Prior Utilization + Demographic		0.116***	0.092***

*=p<.05, **=p<.01, ***=p≤.001

Includes psychological and evaluation and management visits provided by either a physician or a clinical trained non-physician such as a psychologist

Table 33
Use of Psychological Services Visits with a Mental Illness Diagnosis by MSHO Nursing Home Residents Compared to Controls

	MSHO	Control-In	Control-Out
Persons Served			
-Unadjusted mean monthly rates per 100 enrollees	2.27	4.78	2.18
-Regression Coefficients			
Raw		0.763***	-0.045
Prior Utilization + Demographic		0.572***	-0.112
Number of Services Received			
-Unadjusted mean monthly rates per 100 enrollees	3.44	10.23	5.07
-Regression Coefficients			
Raw		0.067***	0.016***
Prior Utilization + Demographic		0.060***	0.016***

*=p<.05, **=p<.01, ***=p≤.001

Psychological services may be performed by either a physician or a clinical trained non-physician such as a psychologist

Table 34
Use of Physician Services for Psychological Treatment of Mental Illness by MSHO Nursing Home Compared to Controls

	MSHO	Control-In	Control-Out
Persons Served			
-Unadjusted mean monthly rates per 100 enrollees	1.89	3.40	1.41
-Regression Coefficients			
Raw		0.606***	-0.302***
Prior Utilization + Demographic		0.366***	-0.349***
Number of Services Received			
-Unadjusted mean monthly rates per 100 enrollees	2.50	6.23	2.92
-Regression Coefficients			
Raw		0.037***	0.004*
Prior Utilization + Demographic		0.033***	0.007*

*=p<.05, **=p<.01, ***=p≤.001

Table 35
Use of Evaluation and Management Visits for the Treatment of Mental Illness by MSHO Nursing Home Residents Compared to Controls

	MSHO	Control-In	Control-Out
Persons Served			
-Unadjusted mean monthly rates per 100 enrollees	4.07	5.85	7.08
-Regression Coefficients			
Raw		0.374***	0.573***
Prior Utilization + Demographic		0.319***	0.504***
Number of Services Received			
-Unadjusted mean monthly rates per 100 enrollees	4.71	10.29	12.43
-Regression Coefficients			
Raw		0.056***	0.077***
Prior Utilization + Demographic		0.056***	0.076***

*=p<.05, **=p<.01, ***=p≤.001

Evaluation and management services may be performed by either a physician or a clinical trained non-physician such as a psychologist

Table 36
Use of Physician Services for Evaluation and Management Visits for the Treatment of
Mental Illness by MSHO Nursing Home Residents Compared to Controls

	MSHO	Control-In	Control-Out
Persons Served			
-Unadjusted mean monthly rates per 100 enrollees	4.03	4.85	6.47
-Regression Coefficients			
Raw		0.187***	0.485***
Prior Utilization + Demographic		0.114***	0.401***
Number of Services Received			
-Unadjusted mean monthly rates per 100 enrollees	4.66	8.85	11.60
-Regression Coefficients			
Raw		0.042***	0.069***
Prior Utilization + Demographic		0.041***	0.067***

*=p<.05, **=p<.01, ***=p≤.001

Table 37
Rates of Treatment for Dementia by MSHO Nursing Home Residents
Compared to Controls

	MSHO	Control-In	Control-Out
Persons Served			
-Unadjusted mean monthly rates per 100 enrollees	6.98	4.98	6.49
-Regression Coefficients			
Raw		-0.371***	-0.094***
Prior Utilization + Demographic		-0.505***	-0.105**
Number of Services Received			
-Unadjusted mean monthly rates per 100 enrollees	7.51	8.64	11.52
-Regression Coefficients			
Raw		0.010***	0.039***
Prior Utilization + Demographic		0.006	0.047***

*=p<.05, **=p<.01, ***=p≤.001

Includes psychological and evaluation and management visits for dementia care provided by physicians or a clinical trained non-physician such as a psychologist

Table 38
**Rate of Evaluation and Management Visits for the Treatment of Dementia by MSHO
Nursing Home Residents Compared to Controls**

	MSHO	Control-In	Control-Out
Persons Served			
-Unadjusted mean monthly rates per 100 enrollees	6.82	4.65	6.01
-Regression Coefficients			
Raw		-0.418***	-0.152***
Prior Utilization + Demographic		-0.544***	-0.171***
Number of Services Received			
-Unadjusted mean monthly rates per 100 enrollees	7.30	8.05	10.49
-Regression Coefficients			
Raw		0.006***	0.031***
Prior Utilization + Demographic		0.002	0.037***

*=p<.05, **=p<.01, ***=p≤.001

Evaluation and management services may be performed by either a physician or a clinical trained non-physician such as a psychologist

Table 39
**Rate of Physician Evaluation and Management Visits for Dementia by MSHO Nursing
Home Residents Compared to Controls**

	MSHO	Control-In	Control-Out
Persons Served			
-Unadjusted mean monthly rates per 100 enrollees	6.72	4.12	5.82
-Regression Coefficients			
Raw		-0.528***	-0.169***
Prior Utilization + Demographic		-0.674***	-0.195***
Number of Services Received			
-Unadjusted mean monthly rates per 100 enrollees	7.17	7.17	10.22
-Regression Coefficients			
Raw		-0.001	0.029***
Prior Utilization + Demographic		-0.006*	0.034***

*=p<.05, **=p<.01, ***=p≤.001

Home and Community Based Services

The extent of use of various community services by community residents is
shown in Tables 40. Calculations were based on the total MSHO community population
under the assumption that because of MSHO's flexible benefit set, any community
member could receive these services. The calculations for the control groups were limited
to those individuals eligible for the Elderly Waiver program because those are the only
individuals who potentially could receive Home and Community Based Services. With
the exception of the Medicare-covered home health services, the rest of the comparisons

are with the services typically covered under the Elderly Waiver program for PMAP enrollees. MSHO clients were much more likely to use home health nursing than either control group. The pattern for community services overall is a little more complex. MSHO clients use fewer community services of any type than either control group. Both control groups use significantly more of the following services than MSHO: semi-residential services, out-of-home care, lower level assistance in the home, and case management. MSHO clients use more special transport. MSHO enrollees use significantly fewer personal care attendants or home health aides than Control-In enrollees and control-out enrollees although the direction changes after adjustment. It is important to note that some of the services measured here are services that may be provided directly by health plans or care systems on a voluntary basis to the less frail community residents and not reported as a billable service in the encounter data, such as case management.

Table 40
Comparisons of the Use of Community Services for Community Residents Expressed as Percent of Persons Using the Service

	MSHO	Control-In	Control-Out
Persons with Home Health Nurse Visits†			
-Unadjusted average percent of clients	14.52	11.40	9.99
-Regression Coefficients			
Raw		-0.267***	-0.410***
Prior Utilization + Demographic		0.167***	-0.459***
Community Services (MSHO Senior Waiver Only)			
Persons with Any Community Based Services‡			
-Unadjusted average percent of clients	31.10	97.60	97.26
-Regression Coefficients			
Raw		4.430***	4.373***
Prior Utilization + Demographic		2.708***	2.464***
Persons with Semi Residential Services‡			
-Unadjusted average percent of clients	1.73	14.91	36.56
-Regression Coefficients			
Raw		2.197***	3.332***
Prior Utilization + Demographic		1.302***	2.488***
Persons with Out of Home Care‡			
-Unadjusted average percent of clients	2.13	14.87	4.09
-Regression Coefficients			
Raw		1.957***	0.754***
Prior Utilization + Demographic		0.601***	-0.971***
Persons with Lower Level Assistance in Home‡			
-Unadjusted average percent of clients	11.03	63.04	51.56
-Regression Coefficients			
Raw		2.612***	2.142***
Prior Utilization + Demographic		1.286***	0.561***

	MSHO	Control-In	Control-Out
Persons with Respite Care‡			
-Unadjusted average percent of clients	0.02	0.37	0.37
-Regression Coefficients			
Raw		2.792***	2.821***
Prior Utilization + Demographic		0.467	0.229
Persons with Special Transport‡			
-Unadjusted average percent of clients	14.74	21.82	9.60
-Regression Coefficients			
Raw		0.460***	-0.427***
Prior Utilization + Demographic		-0.204***	-1.304***
Persons with Case Management‡			
-Unadjusted average percent of clients	7.62	80.20	54.44
-Regression Coefficients			
Raw		3.784***	2.723***
Prior Utilization + Demographic		2.490***	1.403***
Persons with Personal Care/Home Health Aide‡			
-Unadjusted average percent of clients	11.76	37.81	22.47
-Regression Coefficients			
Raw		1.503***	0.867***
Prior Utilization + Demographic		0.117**	-0.762***

Note: † The N for the Raw group for Home Health Nurse Visits was 251,205 person months. The N for the Demographic and Utilization group was 116,013 person months.
    ‡ The N for the Raw group for the Community Service groups was 50,790. The N for the Demographic and Utilization group was 25,742 person months.

*=$p<.05$, **=$p<.01$, ***=$p\leq.001$

Utilization Analysis – Community Frail Sub Group [*]

The MSHO population has a disproportionate number of nursing home certifiable persons in their population compared to the control groups. In addition, MSHO receives additional funds specifically to care for those individuals living in the community identified as frail and at risk of entering a nursing home. MSHO rate structure provides the average monthly Elderly Waiver payment and the 2.39 PACE adjustor for Medicare for the nursing home certifiable community residents. Because of this, utilization of services by the community dwelling frail was examined separately. For the purposes of this examination a frail person was defined as being enrolled in the Elderly Waiver program for control persons and being in rate cell B for MSHO persons.

Figure 9 shows what percent of the community dwelling population is frail in each month. The proportion gradually increased over the study period in all three groups. However, the rate of increase was greatest in the Control-In population so that it caught up to the MSHO rate in late 1999.

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[*] A separate sub group analysis was conducted of only the community well or non-frail. The results were consistent with the results for the entire community population.

Figure 9
Percent of Community Population That Is Nursing Home Certifiable
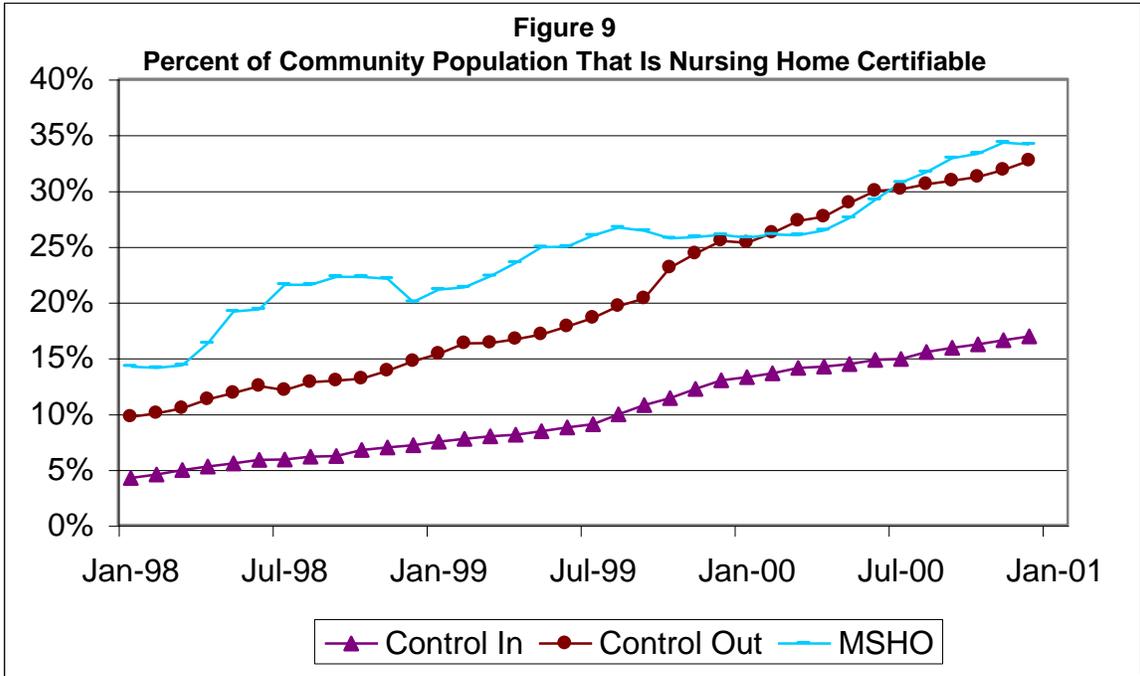
Utilization among the community dwelling frail was tested using the same three sets of adjustors as used previously in this report. The set of adjustors that include prior utilization require that the person had to be in the system for a period of time prior to the month being examined. The issue of comparability of the populations with and without prior utilization information has already been addressed for the whole population. However, it was felt necessary to redo this analysis in the frail community dwelling population because of the potentially higher death rate. As with the whole population, we found similarities in those months where prior utilization was available and where it was not (Table 41). In the MSHO community frail population those with history tended to be less likely to have originally come to Medicare as disabled, less likely to be in the youngest age category, and less likely to be white than those months without prior utilization information. The Control-In and Control-Out population were even more similar between those with and without historical data.

Table 41
Comparison of Frail Person Months with and without Information on Prior Utilization

MSHO	Without prior utilization history	With prior utilization history	Significance
Age (average)	76.8	77.8	n.s.
Youngest Age Group	14%	6%	p<.001
Originally Disabled	23%	17%	p<.001
White	63%	52%	p<.001
Hospital Admissions	7.5	6.5	n.s.
Hospital Days	42.2	36.2	n.s.
Provider Visits	105.0	93.4	p<.001

Control-In	Without prior utilization history	With prior utilization history	
Age (average)	78.2	79.0	n.s.
Youngest Age Group	13%	4%	p<.001
Originally Disabled	16%	16%	n.s.
White	78%	78%	n.s.
Hospital Admission	7.0	7.3	n.s.
Hospital Days	50.3	45.2	n.s.
Provider Visits	161.8	182.3	p<.001

Control-Out	Without prior utilization history	With prior utilization history	
Age (average)	79.2	79.1	n.s.
Youngest Age Group	12%	7%	p<.001
Originally Disabled	20%	23%	p<.01
White	96%	96%	n.s.
Hospital Admission	6.2	5.6	n.s.
Hospital Days	37.6	38.1	n.s.
Provider Visits	133.0	142.7	n.s.

Table 42 shows monthly rates of utilization in the community dwelling frail and the results of significance testing with and without adjustment. Community dwelling frail persons in the Control-Out group were hospitalized less often than their MSHO counterparts according to testing without adjustors but this did not remain significant with adjustment. These rates were significantly higher those than found in the general population of community persons (4.27 in MSHO, 3.84 in Control-In, and 4.21 in Control-Out). These rates have been added to Table 42 for ease of reference. In contrast to admissions, there was no significant difference between Control-Out frail and MSHO in the number of hospital days. There was no significant difference in the rate of preventable hospital admissions for either group.

Table 42
Mean Monthly Utilization Rates per 100 Community Dwelling Frail Persons

	MSHO	Control-In	Control-Out
Average of Number of Persons in each month	**167**	**556**	**209**
HOSPITALIZATIONS			
Hospital Admissions			
-Unadjusted Mean Monthly Rates Per 100 Enrollees	**7.80**	**8.19**	**6.69**
Comparable rates from whole population	(4.27)	(3.84)	(4.21)
-Regression Coefficients			
Raw		0.037	-0.161 *
Prior Utilization + Demographic		0.099	-0.145
Hospital Days			
-Unadjusted Mean Monthly Rates Per 100 Enrollees	**40.28**	**48.63**	**36.93**
Comparable rates from whole population	(21.90)	(20.54)	(24.61)
-Regression Coefficients			
Raw		0.092	-0.009
Prior Utilization + Demographic		0.077	0.025
Average Inpatient Hospital LOS			
-Unadjusted Mean Monthly Rates Per 100 Enrollees	**5.17**	**6.10**	**5.73**
Comparable rates from whole population	(5.09)	(5.39)	(5.89)
-Regression Coefficients			
Raw		1.104	0.742
Prior Utilization + Demographic		0.683	1.175
Preventable Hospital Admissions			
-Unadjusted Mean Monthly Rates Per 100 Enrollees	**1.88**	**2.05**	**1.74**
Comparable rates from whole population	(0.82)	(0.84)	(0.95)
-Regression Coefficients			
Raw		0.110	-0.108
Prior Utilization + Demographic		0.069	-0.214
EMERGENCY SERVICES			
Emergency Room Services			
-Unadjusted Mean Monthly Rates Per 100 Enrollees	**11.11**	**12.28**	**8.79**
Comparable rates from whole population	(6.36)	(6.51)	(6.05)
-Regression Coefficients			
Raw		0.008	-0.024 ***
Prior Utilization + Demographic		0.002	-0.029 **
Preventable Emergency Room Services			
-Unadjusted Mean Monthly Rates Per 100 Enrollees	**3.73**	**4.79**	**3.62**
Comparable rates from whole population	(2.01)	(2.39)	(2.27)
-Regression Coefficients			
Raw		0.009 **	-0.003
Prior Utilization + Demographic		0.005	-0.009
FACE TO FACE PROVIDER SERVICES			
Number of Face to Face Provider Visits			
-Unadjusted Mean Monthly Rates Per 100 Enrollees	**105.19**	**172.40**	**139.73**
Comparable rates from whole population	(77.78)	(115.11)	(114.10)
-Regression Coefficients			
Raw		0.730 ***	0.387 ***

	MSHO	Control-In	Control-Out
Prior Utilization + Demographic		0.828 ***	0.452 ***
Persons Receiving a Face to Face Provider Service			
-Unadjusted Mean Monthly Rates Per 100 Enrollees	**52.77**	**52.88**	**46.21**
Comparable rates from whole population	(40.58)	(38.72)	(39.29)
-Regression Coefficients			
Raw		0.066 *	-0.207 ***
Prior Utilization + Demographic		0.109 **	-0.262 ***
COMMUNITY SERVICES			
Home Health Nurse Visit (yes/no)			
-Unadjusted Mean Monthly Rates Per 100 Enrollees	**41.61**	**41.97**	**21.87**
-Regression Coefficients		0.092 **	-0.759 ***
Raw		0.095 **	-0.756 ***
Prior Utilization + Demographic			
Case Management (yes/no)			
-Unadjusted Mean Monthly Rates Per 100 Enrollees	**26.69**	**80.20**	**54.44**
-Regression Coefficients		2.386 ***	1.324 ***
Raw		2.428 ***	1.395 ***
Prior Utilization + Demographic			
Any of the Community Services listed below			
-Unadjusted Mean Monthly Rates Per 100 Enrollees	**74.80**	**92.48**	**94.01**
-Regression Coefficients			
Raw		1.469 ***	1.701 ***
Prior Utilization + Demographic		1.661 ***	1.589 ***
Semi Residential (yes/no)			
-Unadjusted Mean Monthly Rates Per 100 Enrollees	**5.78**	**14.91**	**36.56**
-Regression Coefficients		0.911 ***	2.046 ***
Raw		0.820 ***	1.892 ***
Prior Utilization + Demographic			
Out of Home Care (yes/no)			
-Unadjusted Mean Monthly Rates Per 100 Enrollees	**7.86**	**14.87**	**4.09**
-Regression Coefficients		0.623 ***	-0.577 ***
Raw		0.791 ***	-0.293 ***
Prior Utilization + Demographic			
Lower Level Assistance in Home (yes/no)			
-Unadjusted Mean Monthly Rates Per 100 Enrollees	**36.31**	**63.04**	**51.56**
-Regression Coefficients		1.166 ***	0.695 ***
Raw		1.163 ***	0.578 ***
Prior Utilization + Demographic			
Respite Care (yes/no)			
-Unadjusted Mean Monthly Rates Per 100 Enrollees	**0.06**	**0.37**	**0.37**
-Regression Coefficients			
Raw		1.433 **	1.461 **
Prior Utilization + Demographic		0.467	0.229
Special Transport (yes/no)			
-Unadjusted Mean Monthly Rates Per 100 Enrollees	**27.11**	**21.82**	**9.60**
-Regression Coefficients			
Raw		-0.240 ***	-1.126 ***

	MSHO	Control-In	Control-Out
Prior Utilization + Demographic		-0.192 ***	-1.293 ***
Personal Care/HH Aide (yes/no)			
-Unadjusted Mean Monthly Rates Per 100 Enrollees	**37.13**	**37.81**	**22.47**
-Regression Coefficients			
Raw		0.063 *	-0.573 ***
Prior Utilization + Demographic		0.099 *	-0.795 ***

Raw: n=33,524
Prior Utilization + Demographic: n=15,865

* p<.05, ** p<.01, *** p<.001

Community dwelling frail persons in the Control-Out group were significantly less likely to receive emergency room services than MSHO frail with and without adjustment (8.8 per 100 per month versus 11.1 per 100 per month). Control-Out did not differ from MSHO in terms of preventable emergency services. The Control-In frail community population experienced more preventable emergency services than MSHO as seen with no adjustment but this did not remain significant with adjustment.

Community dwelling frail persons in both the Control-Out and Control-In groups reported more face-to-face provider visits per 100 enrollees than the MSHO community frail. These rates were an average of 105.2 visits for 100 frail MSHO enrollees each month compared to 172.4 visits for Control-In persons and 139.7 visits for Control-Out persons. The general community dwelling population numbers were 77.8 for MSHO persons, 115.1 for Control-In persons, and 114.1 for Control-Out persons.

In contrast to the findings on the number of visits, the Control-Out frail population had a lower rate of being seen than MSHO when the number of persons receiving a visit was examined. Although the raw data looked very similar, the number of persons seen was significantly higher in the Control-In population compared to MSHO. For this analysis, the rates were an average of 52.8% of MSHO frail receiving a provider visit each month compared to 52.9% of Control-Ins and 46.2% of Control-Outs. The rates in general population were 40.6% in MSHO, 38.7% in Control-In and 39.3% in Control-Out.

The Control-In Elderly Waiver population was more likely to receive community services than MSHO rate cell B persons in all categories except for special transport when they received less. With the exception of Home Health Nurse and Respite Care the significance held for both adjusted and unadjusted analyses. The Control-Out Elderly Waiver population was less likely than the MSHO population to receive home health nurse services, out of home care, special transport, and personal care/home health aide services. They were more likely to receive semi residential services, lower level assistance in the home, and case management. Accurate measurement of case management and other home and community-based services is problematic in the MSHO population. These services may be provided directly by health plans or care

systems and not reported as a billable service in the encounter data. For this reason it was not included in the "any community aid" category.

Utilization Analysis - Sub Analysis Duration of MSHO Enrollment on Utilization of Services

Tables 43 - 52 summarize the analyses of MSHO utilization compared to the control groups. In these tables the samples have been divided to account for the length of exposure to MSHO. The analyses are presented first to show the actual raw rates and then to show the results of unadjusted and adjusted regression models. The first uses simply the raw data with no adjustments. The second model adjusts for demographic and concurrent characteristics (age and sex) and for the community sample for whether the person was classified as nursing home eligible,, length of enrollment in Medicaid and information on utilization during the six-month period from 18 to 12 months prior to the observation month.

Table 43 shows the rate of hospital admissions for the community sample. The basic pattern shows no significant differences regardless of the level of adjustment or exposure to MSHO. Of the 12 regressions reported, one shows modest significance but this was before adjustment and likely due to chance. There is no change in hospital admission compared to controls with increased exposure to MSHO.

Table 44 shows the same analysis for the nursing home sample. The MSHO rates are consistently significantly lower than those for the controls in the same geographic area – Control-In group, but not significantly different from those for the Control-Out group. The same pattern holds for all exposures to MSHO. Increase duration of length of exposure in MSHO does not change the pattern of results. Again, the one significant difference is likely a chance event.

Tables 45 and 46 examine preventable hospitalization rates. The patterns are basically the same as for the overall rates. The one significant difference for the community samples is likely due to chance. In the nursing home sample, the pattern of significant difference for the Control-In group is consistent across the different lengths of exposure to MSHO; there is no significant difference for the Control-Out group. Again, there is no significant change in results related to length of exposure to MSHO for preventable hospital admission.

Table 47 looks at emergency room use for the community sample. There is one instance when the Control-Out group rate is lower than that for MSHO; but only for the lowest exposure groups. This significant difference disappears with increased exposure to MSHO.

By contrast, the emergency room rates for the nursing home samples, shown in Table 48, reveal a consistent pattern. The MSHO rates are significantly lower than both control groups across all exposure levels for almost all analyses. Exposure to MSHO does not change the pattern of results.

The pattern for preventable emergency room use differs from the overall use pattern for the community sample. As shown in Table 49, the MSHO rate is significantly lower than the Control-In group with greater exposure to MSHO. The differences with the Control-Out group are less impressive.

The comparable data for the nursing home sample, seen in Table 50, shows a familiar pattern, but with more effect than in other areas. In almost every instance the MSHO rate is lower than the Control-In group. It is also lower than the Control-Out group in most instances. Duration in MSHO does not impact the pattern of results.

Table 51 shows the rate of provider visits for the community sample. The rates for both control groups are consistently higher than those for MSHO. The same pattern is seen for the nursing home sample, shown in Table 52. Duration to MSHO does not change the pattern or results relating to provider visits.

In summary, there are no consistently significant differences in the use of hospitals among the community sample, but MSHO is associated with less use of hospitals and emergency rooms for nursing home residents. MSHO also shows lower rates of use of emergency rooms for community residents for potentially preventable conditions. These findings do not vary by length of exposure to MSHO and are consistent with the previously reported cross sectional results.

Table 43
Average Monthly Number of Hospital Admissions per 100 Community Dwelling Persons
by Length of Exposure to MSHO

	MSHO by Length of Exposure			Control-In	Control-Out
	< 6 Months	6-12 Months	> 12 Months		
Hospital Admission Rates	3.88	4.27	4.48	3.84	4.21
Versus MSHO < 6 Months					
Unadjusted Mean Monthly Rates per 100 enrollees	3.88			3.84	4.21
Regression Coefficients					
Raw				-0.002	0.101
Demographic + Utilization Adjustment				0.010	-0.039
Controls with > 6 months Dual Hx Versus MSHO Enrolled 6-12 Months					
Unadjusted Mean Monthly Rates per 100 enrollees		4.27		3.84	4.12
Regression Coefficients					
Raw				-0.133	-0.052
Demographic + Utilization Adjustment				0.288	0.238
Controls with > 12 months Dual Hx Versus MSHO Enrolled > 12 Months					
Unadjusted Mean Monthly Rates per 100 enrollees			4.48	3.83	4.11
Regression Coefficients					
Raw				-0.119 *	-0.039
Demographic + Utilization Adjustment				-0.056	-0.093

* $p<.05$, ** $p<.01$, ***$p<.001$
Ns for the runs
- All controls versus persons in MSHO for less than 6 months raw N=234,042 person months. N when demographic and historical utilization included 104,504 person months.
- Controls with more than 6 months dual eligibility versus persons in MSHO for 6 to 12 months raw N=202,517 person months. N when demographic and historical utilization included 104,436 person months.
- Controls with more than 12 months dual eligibility versus persons in MSHO for more than 12 months raw N=179,871 person months. N when demographic and historical utilization included 112,493 person months.

Table 44
Average Monthly Number of Hospital Admissions per 100 Nursing Home Dwelling Persons
by Length of Exposure to MSHO

	MSHO by Length of Exposure			Control-In	Control-Out
	< 6 Months	6-12 Months	> 12 Months		
Hospital Admission Rates	2.98	2.81	3.07	3.85	2.90
Versus MSHO < 6 Months					
Unadjusted Mean Monthly Rates per 100 enrollees	2.98			3.85	2.90
Regression Coefficients					
Raw				0.243 ***	-0.034
Demographic + Utilization Adjustment				0.353 **	0.213
Controls with > 6 months Dual Hx Versus MSHO Enrolled 6-12 Months					
Unadjusted Mean Monthly Rates per 100 enrollees		2.81		3.75	2.72
Regression Coefficients					
Raw				0.337 ***	0.026
Demographic + Utilization Adjustment				0.229	0.092
Controls with > 12 months Dual Hx Versus MSHO Enrolled > 12 Months					
Unadjusted Mean Monthly Rates per 100 enrollees			3.07	3.69	2.62
Regression Coefficients					
Raw				0.362 ***	0.030
Demographic + Utilization Adjustment				0.285 ***	0.141 *

*p<.05, ** p<.01, ***p<.001

Ns for the runs
- All controls versus persons in MSHO for less than 6 months raw N=201,423 person months. N when demographic and historical utilization included 71,767 person months.
- Controls with more than 6 months dual eligibility versus persons in MSHO for 6 to 12 months raw N=168,423 person months. N when demographic and historical utilization included 71,343 person months.
- Controls with more than 12 months dual eligibility versus persons in MSHO for more than 12 months raw N=165,790 person months. N when demographic and historical utilization included 99,121 person months.

Table 45
Average Monthly Number of Preventable Hospital Admissions
per 100 Community Dwelling Persons by Length of Exposure to MSHO

	MSHO by Length of Exposure			Control-In	Control-Out
	< 6 Months	6-12 Months	> 12 Months		
Preventable Hospital Admission Rates	0.62	0.68	0.95	0.84	0.95
Versus MSHO < 6 Months					
Unadjusted Mean Monthly Rates per 100 enrollees	0.62			0.84	0.95
Regression Coefficients					
Raw				0.291	0.406 *
Demographic + Utilization Adjustment				-0.048	-0.155
Controls with > 6 months Dual Hx Versus MSHO Enrolled 6-12 Months					
Unadjusted Mean Monthly Rates per 100 enrollees		0.68		0.84	0.95
Regression Coefficients					
Raw				0.151	0.275
Demographic + Utilization Adjustment				0.501	0.400
Controls with > 12 months Dual Hx Versus MSHO Enrolled > 12 Months					
Unadjusted Mean Monthly Rates per 100 enrollees			0.95	0.84	0.94
Regression Coefficients					
Raw				-0.159	-0.043
Demographic + Utilization Adjustment				-0.123	-0.200

*p<.05, ** p<.01, ***p<.001

Ns for the runs
- All controls versus persons in MSHO for less than 6 months raw N=234,042 person months. N when demographic and historical utilization included 104,504 person months.
- Controls with more than 6 months dual eligibility versus persons in MSHO for 6 to 12 months raw N=202,517 person months. N when demographic and historical utilization included 104,436 person months.
- Controls with more than 12 months dual eligibility versus persons in MSHO for more than 12 months raw N=179,871 person months. N when demographic historical utilization included 112,493 person months.

Table 46
Average Monthly Number of Preventable Hospital Admissions
per 100 Nursing Home Dwelling Persons by Length of Exposure to MSHO

	MSHO by Length of Exposure			Control-In	Control-Out
	< 6 Months	6-12 Months	> 12 Months		
Preventable Hospital Admission Rates	0.57	0.44	0.59	0.75	0.49
Versus MSHO < 6 Months					
Unadjusted Mean Monthly Rates per 100 enrollees	0.57			0.75	0.49
Regression Coefficients					
Raw				0.293 **	-0.123
Demographic + Utilization Adjustment				0.438	0.247
Controls with > 6 months Dual Hx Versus MSHO Enrolled 6-12 Months					
Unadjusted Mean Monthly Rates per 100 enrollees		0.44		0.72	0.47
Regression Coefficients					
Raw				0.507 ***	0.187
Demographic + Utilization Adjustment				0.652 ***	0.464
Controls with > 12 months Dual Hx Versus MSHO Enrolled > 12 Months					
Unadjusted Mean Monthly Rates per 100 enrollees			0.59	0.73	0.46
Regression Coefficients					
Raw				0.367 ***	-0.081
Demographic + Utilization Adjustment				0.272 ***	0.060

*p<.05, ** p<.01, ***p<.001

Ns for the runs
- All controls versus persons in MSHO for less than 6 months raw N=201,423 person months. N when demographic and historical utilization included 71,767 person months.
- Controls with more than 6 months dual eligibility versus persons in MSHO for 6 to 12 months raw N=168,423 person months. N when demographic and historical utilization included 71,343 person months.
- Controls with more than 12 months dual eligibility versus persons in MSHO for more than 12 months raw N=165,790 person months. N when demographic and historical utilization included 99,121 person months.

Table 47
Average Monthly Number of Emergency Services per 100 Community Dwelling Persons by
Length of Exposure to MSHO

	MSHO by Length of Exposure			Control-In	Control-Out
	< 6 Months	6-12 Months	> 12 Months		
Emergency Service Rates	6.38	5.96	6.53	6.51	6.05
Versus MSHO < 6 Months					
Unadjusted Mean Monthly Rates per 100 enrollees	6.38			6.51	6.05
Regression Coefficients					
Raw				0.002	-0.003
Demographic + Utilization Adjustment				-0.012	-0.023 **
Controls with > 6 months Dual Hx Versus MSHO Enrolled 6-12 Months					
Unadjusted Mean Monthly Rates per 100 enrollees		5.96		6.52	5.94
Regression Coefficients					
Raw				0.004	-0.002
Demographic + Utilization Adjustment				0.008	-0.003
Controls with > 12 months Dual Hx Versus MSHO Enrolled > 12 Months					
Unadjusted Mean Monthly Rates per 100 enrollees			6.53	6.50	5.84
Regression Coefficients					
Raw				-0.001	-0.007
Demographic + Utilization Adjustment				0.005	-0.006

*p<.05, ** p<.01, ***p<.001

Ns for the runs
- All controls versus persons in MSHO for less than 6 months raw N=234,042 person months. N when demographic and historical utilization included 104,504 person months.
- Controls with more than 6 months dual eligibility versus persons in MSHO for 6 to 12 months raw N=202,517 person months. N when demographic and historical utilization included 104,436 person months.
- Controls with more than 12 months dual eligibility versus persons in MSHO for more than 12 months raw N=179,871 person months. N when demographic and historical utilization included 112,493 person months.

Table 48
Average Monthly Number of Emergency Services per 100 Nursing Home Dwelling Persons
by Length of Exposure to MSHO

	MSHO by Length of Exposure			Control-In	Control-Out
	< 6 Months	6-12 Months	> 12 Months		
Emergency Service Rates	4.16	3.85	4.79	5.90	4.58
Versus MSHO < 6 Months					
Unadjusted Mean Monthly Rates per 100 enrollees	4.16			5.90	4.58
Regression Coefficients					
Raw				0.017 ***	0.004
Demographic + Utilization Adjustment				0.020 ***	0.012 *
Controls with > 6 months Dual Hx Versus MSHO Enrolled 6-12 Months					
Unadjusted Mean Monthly Rates per 100 enrollees		3.85		5.69	4.24
Regression Coefficients					
Raw				0.019 ***	0.009 ***
Demographic + Utilization Adjustment				0.015 **	0.007
Controls with > 12 months Dual Hx Versus MSHO Enrolled > 12 Months					
Unadjusted Mean Monthly Rates per 100 enrollees			4.79	5.58	4.18
Regression Coefficients					
Raw				0.020 ***	0.006 ***
Demographic + Utilization Adjustment				0.017 ***	0.008 ***

*p<.05, ** p<.01, ***p<.001

Ns for the runs
- All controls versus persons in MSHO for less than 6 months raw N=201,423 person months. N when demographic and historical utilization included 71,767 person months.
- Controls with more than 6 months dual eligibility versus persons in MSHO for 6 to 12 months raw N=168,423 person months. N when demographic and historical utilization included 71,343 person months.
- Controls with more than 12 months dual eligibility versus persons in MSHO for more than 12 months raw N=165,790 person months. N when demographic and historical utilization included 99,121 person months.

Table 49
Average Monthly Number of Preventable Emergency Services
per 100 Community Dwelling Persons by Length of Exposure to MSHO

	MSHO by Length of Exposure			Control-In	Control-Out
	< 6 Months	6-12 Months	> 12 Months		
Preventable Emergency Service Rates	1.99	1.52	2.18	2.39	2.27
Versus MSHO < 6 Months					
Unadjusted Mean Monthly Rates per 100 enrollees	1.99			2.39	2.27
Regression Coefficients					
Raw				0.004	0.003
Demographic + Utilization Adjustment				-0.002	-0.007
Controls with > 6 months Dual Hx Versus MSHO Enrolled 6-12 Months					
Unadjusted Mean Monthly Rates per 100 enrollees		1.52		2.40	2.20
Regression Coefficients					
Raw				0.008 **	0.006 *
Demographic + Utilization Adjustment				0.009 *	0.005
Controls with > 12 months Dual Hx Versus MSHO Enrolled > 12 Months					
Unadjusted Mean Monthly Rates per 100 enrollees			2.18	2.37	2.18
Regression Coefficients					
Raw				0.001	0.000
Demographic + Utilization Adjustment				0.004 *	0.000

*p<.05, ** p<.01, ***p<.001

Ns for the runs
- All controls versus persons in MSHO for less than 6 months raw N=234,042 person months. N when demographic and historical utilization included 104,504 person months.
- Controls with more than 6 months dual eligibility versus persons in MSHO for 6 to 12 months raw N=202,517 person months. N when demographic and historical utilization included 104,436 person months.
- Controls with more than 12 months dual eligibility versus persons in MSHO for more than 12 months raw N=179,871 person months. N when demographic and historical utilization included 112,493 person months.

Table 50
Average Monthly Number of Preventable Emergency Services
per 100 Nursing Home Dwelling Persons by Length of Exposure to MSHO

	MSHO by Length of Exposure			Control-In	Control-Out
	< 6 Months	6-12 Months	> 12 Months		
Preventable Emergency Service Rates	1.79	1.65	1.90	2.49	2.08
Versus MSHO < 6 Months					
Unadjusted Mean Monthly Rates per 100 enrollees	1.79			2.49	2.08
Regression Coefficients					
Raw				0.007 ***	0.003 *
Demographic + Utilization Adjustment				0.005	0.003
Controls with > 6 months Dual Hx Versus MSHO Enrolled 6-12 Months					
Unadjusted Mean Monthly Rates per 100 enrollees		1.65		2.39	1.95
Regression Coefficients					
Raw				0.008 ***	0.003 *
Demographic + Utilization Adjustment				0.008 *	0.006
Controls with > 12 months Dual Hx Versus MSHO Enrolled > 12 Months					
Unadjusted Mean Monthly Rates per 100 enrollees			1.90	2.38	1.92
Regression Coefficients					
Raw				0.008 ***	0.004 **
Demographic + Utilization Adjustment				0.007 ***	0.005 ***

* $p<.05$, ** $p<.01$, ***$p<.001$
Ns for the runs
- All controls versus persons in MSHO for less than 6 months raw N=201,423 person months. N when demographic and historical utilization included 71,767 person months.
- Controls with more than 6 months dual eligibility versus persons in MSHO for 6 to 12 months raw N=168,423 person months. N when demographic and historical utilization included 71,343 person months.
- Controls with more than 12 months dual eligibility versus persons in MSHO for more than 12 months raw N=165,790 person months. N when demographic and historical utilization included 99,121 person months.

Table 51
Average Monthly Number of Face-to-Face Provider Visits per 100 Community Dwelling Persons by Length of Exposure to MSHO

	MSHO by Length of Exposure			Control-In	Control-Out
	< 6 Months	6-12 Months	> 12 Months		
Face to Face Provider Visit Rates	83.00	70.98	77.28	115.11	114.10
Versus MSHO < 6 Months					
Unadjusted Mean Monthly Rates per 100 enrollees	83.00			115.11	114.10
Regression Coefficients					
Raw				0.329 ***	0.317 ***
Demographic + Utilization Adjustment				0.442 ***	0.241 ***
Controls with > 6 months Dual Hx Versus MSHO Enrolled 6-12 Months					
Unadjusted Mean Monthly Rates per 100 enrollees		70.98		116.37	114.06
Regression Coefficients					
Raw				0.464 ***	0.439 ***
Demographic + Utilization Adjustment				0.565 ***	0.363 ***
Controls with > 12 months Dual Hx Versus MSHO Enrolled > 12 Months					
Unadjusted Mean Monthly Rates per 100 enrollees			77.28	116.81	114.77
Regression Coefficients					
Raw				0.432 ***	0.407 ***
Demographic + Utilization Adjustment				0.552 ***	0.359 ***

*p<.05, ** p<.01, ***p<.001

Ns for the runs
- All controls versus persons in MSHO for less than 6 months raw N=234,042 person months. N when demographic and historical utilization included 104,504 person months.
- Controls with more than 6 months dual eligibility versus persons in MSHO for 6 to 12 months raw N=202,517 person months. N when demographic and historical utilization included 104,436 person months.
- Controls with more than 12 months dual eligibility versus persons in MSHO for more than 12 months raw N=179,871 person months. N when demographic and historical utilization included 112,493 person months.

Table 52
Average Monthly Number of Face-to-Face Provider Visits per 100 Nursing Home Dwelling Persons by Length of Exposure to MSHO

	MSHO by Length of Exposure			Control-In	Control-Out
	< 6 Months	6-12 Months	> 12 Months		
Face to Face Provider Visit Rates	92.24	84.70	82.62	135.04	145.35
Versus MSHO < 6 Months					
Unadjusted Mean Monthly Rates per 100 enrollees	92.24			135.04	145.35
Regression Coefficients					
Raw				0.471 ***	0.575 ***
Demographic + Utilization Adjustment				0.514 ***	0.591 ***
Controls with > 6 months Dual Hx Versus MSHO Enrolled 6-12 Months					
Unadjusted Mean Monthly Rates per 100 enrollees		84.7		136.2	144.7
Regression Coefficients					
Raw				0.514 ***	0.602 ***
Demographic + Utilization Adjustment				0.577 ***	0.655 ***
Controls with > 12 months Dual Hx Versus MSHO Enrolled > 12 Months					
Unadjusted Mean Monthly Rates per 100 enrollees			82.6	136.4	143.5
Regression Coefficients					
Raw				0.551 ***	0.625 ***
Demographic + Utilization Adjustment				0.554 ***	0.631 ***

* p<.05, ** p<.01, ***p<.001

Ns for the runs
- All controls versus persons in MSHO for less than 6 months raw N=201,423 person months. N when demographic and historical utilization included 71,767 person months.
- Controls with more than 6 months dual eligibility versus persons in MSHO for 6 to 12 months raw N=168,423 person months. N when demographic and historical utilization included 71,343 person months.
- Controls with more than 12 months dual eligibility versus persons in MSHO for more than 12 months raw N=165,790 person months. N when demographic and historical utilization included 99,121 person months.

Utilization - Cohort Analysis

     To enable the cohort analysis, six cohorts were created: two experimental (MSHO) cohorts (community and nursing home) and four control cohorts (Control-In and Control-Out, community and nursing home). The MSHO cohort was a moving cohort based upon the time of enrollment. The control cohort was created using pair-wise selection with replacement. It allows every control person to serve as a match for different study people at different time moments and to participate in the corresponding control cohort more then once. A virtual MSHO enrollment date was assigned to controls

based on but may not be equal to the enrollment date of the matched study person. Tables 53 and 54 indicate how well the community and nursing home cohorts matched at the time of MSHO enrollment (and pseudo enrollment for the controls). The cohorts lost membership, approximately at the same rate, 30% over one year, after enrollment in MSHO and the control cohort (virtual enrollment). One year after enrollment all cohorts were still balanced except MSHO had a higher percent of nursing home certifiable enrollees.

Table 53
Demographics in a Matched Community Dwelling Cohort

	MSHO	Control-In	Control-Out
At Time of Matching (Enrollment)			
Average Age (SD)	74.2 (6.9)	74.1 (6.9)	73.9 (6.6)
Average Length of Dual Eligibility (SD)	12.8 (12.5)	12.8 (12.5)	12.9 (12.3)
% Elderly Waiver of Rate Cell B	10%	10%	10%
% Male	26%	26%	26%
% White	50%	50%	50%
% Originally Enrolled into Medicare As Disabled	12%	12%	12%
Hospital Admission in 6 months before Enrollment	14%	14%	16%
ER Service in the 6 months before Enrollment	21%	21%	21%
At One Year After Matching			
Average Age (SD)	74.9 (6.5)	75.0 (6.6)	74.6 (6.2)
Average Length of Dual Eligibility (SD)	21.8 (9.8)	21.9 (9.8)	22.0 (9.9)
% Elderly Waiver of Rate Cell B	21%	10% ***	12% ***
% Male	26%	27%	26%
% White	51%	52%	51%
% Originally Enrolled into Medicare As Disabled	12%	11%	13%
Hospital Admission in 6 months before Enrollment	15%	15%	15%
ER Service in the 6 months before Enrollment	21%	21%	19%

* p<.05, ** p<.01, ***p<.001

At time of enrollment, all groups have N of 1285
At 12 months after enrollment MSHO=868, Control-In =875, Control-Out=846

Significance testing by chi square or independent t-tests comparing each control group to MSHO separately

Table 54
Demographics in a Matched Nursing Home Dwelling Cohort

	MSHO	Control-In	Control-Out
At Time of Matching (Enrollment)			
Average Age (SD)	83.9 (8.7)	83.8 (8.6)	84.0 (8.4)
Average Length of Dual Eligibility (SD)	10.7(12.8)	10.7 (12.7)	10.7 (12.6)
Average Time in Nursing Home (SD)	9.7 (12.0)	9.8 (11.9)	9.8 (11.9)
Average Morris ADL Score (SD)	13.9 (9.3)	13.9 (8.9)	14.5 (8.3) *
% Male	25%	25%	25%
% White	96%	96%	96%
% Originally Enrolled into Medicare As Disabled	14%	14%	14%
Hospital Admission in 6 months before Enrollment	23%	22%	23%
ER Service in the 6 months before Enrollment	29%	27%	28%
At One Year After Matching			
Average Age (SD)	83.9 (8.9)	83.9 (8.7)	84.2 (8.5)
Average Length of Dual Eligibility (SD)	20.9 (10.6)	21.0 (10.4)	21.2 (10.5)
Average Time in Nursing Home (SD)	20.1 (10.1)	20.3 (10.1)	20.4 (10.1)
Average Morris ADL Score (SD)	15.1 (9.3)	15.0 (9.1)	15.9 (8.4)
% Male	24%	24%	24%
% White	96%	96%	98% *
% Originally Enrolled into Medicare As Disabled	15%	16%	17%
Hospital Admission in 6 months before Enrollment	11%	16% **	14%
ER Service in the 6 months before Enrollment	16%	20% **	20% *

* p<.05, ** p<.01, ***p<.001

At time of enrollment, all groups have N of 1,985
At 12 months after enrollment MSHO=939, Control-In =981, Control-Out=876

Significance testing by chi square or independent t-tests comparing each control group to MSHO separately

Tables 55 and 56 indicate the analysis of rates of death for the community and nursing home cohorts. The MSHO community cohort had significantly fewer deaths per month after 18 months of enrollment than the Control-Out group. The MSHO nursing home cohort had significantly fewer deaths per month on average than the Control-In group during the first 6 months after adjustment and with or with out adjustment after 12 months and 18 months of enrollment. There were no significant differences in death rates between the MSHO nursing home cohort and the Control-Out group.

Table 55
Average Monthly Number of Deaths per 100 Community Dwelling Persons
By Time Since Virtual MSHO Enrollment
A Cohort Analysis

	MSHO	Control-In	Control-Out
First Six Months After Enrollment			
Unadjusted Mean Monthly Rates per 100 enrollees	0.33	0.35	0.38
Regression Coefficients			
Raw		-0.099	0.040
Demographic + Utilization Adjustment		-0.130	0.068
First Twelve Months After Enrollment			
Unadjusted Mean Monthly Rates per 100 enrollees	0.34	0.39	0.42
Regression Coefficients			
Raw		0.072	0.098
Demographic + Utilization Adjustment		-0.012	0.076
First Eighteen Months After Enrollment			
Unadjusted Mean Monthly Rates per 100 enrollees	0.32	0.45	0.55
Regression Coefficients			
Raw		0.267	0.373 *
Demographic + Utilization Adjustment		0.184	0.411 *

* p<.05, ** p<.01, ***p<.001

First 6 months n=20,603 person months; First 12 months n=37,068 person months; First 18 months n=49,841 person months

Table 56
Average Monthly Number of Deaths per 100 Nursing Home Dwelling Persons
By Time Since Virtual MSHO Enrollment
A Cohort Analysis

	MSHO	Control-In	Control-Out
First Six Months After Enrollment			
Unadjusted Mean Monthly Rates per 100 enrollees	2.32	2.72	2.57
Regression Coefficients			
Raw		0.175	0.102
Demographic + Utilization Adjustment		0.190 *	0.122
First Twelve Months After Enrollment			
Unadjusted Mean Monthly Rates per 100 enrollees	2.39	2.77	2.43
Regression Coefficients			
Raw		0.166 *	0.033
Demographic + Utilization Adjustment		0.145 *	0.017
First Eighteen Months After Enrollment			
Unadjusted Mean Monthly Rates per 100 enrollees	2.33	2.68	2.46
Regression Coefficients			
Raw		0.161**	0.057
Demographic + Utilization Adjustment		0.125 *	0.034

* p<.05, ** p<.01, ***p<.001

First 6 months n=30,519 person months; First 12 months n=50,689 person months; First 18 months n=63,637 person months

Tables 57 through 62 show the results of the utilization analyses for selected services for the community cohort. Consistent with the cross sectional analyses there were few significant differences. Specifically, MSHO community enrollees had significantly fewer preventable hospital admissions than the Control-In group after 12 months of enrollment and after 18 months of enrollment with adjustment. The MSHO cohort also had significantly fewer preventable emergency services than the Control-In group after 12 months and 18 months of enrollment with and without adjustment. MSHO enrollees had consistently significantly fewer face-to-face physician visits that either control group.

Table 57
Average Monthly Number of Hospital Admissions per 100 Community Dwelling Persons
By Time Since Virtual MSHO Enrollment
A Cohort Analysis

	MSHO	Control-In	Control-Out
First Six Months After Enrollment			
Unadjusted Mean Monthly Rates per 100 enrollees	3.45	3.65	3.62
Regression Coefficients			
Raw		0.047	0.075
Demographic + Utilization Adjustment		0.081	0.130
First Twelve Months After Enrollment			
Unadjusted Mean Monthly Rates per 100 enrollees	3.71	3.77	3.64
Regression Coefficients			
Raw		0.005	0.013
Demographic + Utilization Adjustment		0.041	0.076
First Eighteen Months After Enrollment			
Unadjusted Mean Monthly Rates per 100 enrollees	3.90	3.74	3.75
Regression Coefficients			
Raw		-0.027	-0.007
Demographic + Utilization Adjustment		0.022	0.083

* p<.05, ** p<.01, ***p<.001

First 6 months n=20,603 person months; First 12 months n=37,068 person months; First 18 months n=49,841 person months

Table 58
Average Monthly Number of Hospital Days per 100 Community Dwelling Persons
By Time Since Virtual MSHO Enrollment
A Cohort Analysis

	MSHO	Control-In	Control-Out
First Six Months After Enrollment			
Unadjusted Mean Monthly Rates per 100 enrollees	15.02	18.20	18.39
Regression Coefficients			
Raw		0.008	0.003
Demographic + Utilization Adjustment		0.010	0.007
First Twelve Months After Enrollment			
Unadjusted Mean Monthly Rates per 100 enrollees	17.11	20.57	20.35
Regression Coefficients			
Raw		0.006	0.010
Demographic + Utilization Adjustment		0.012	0.019
First Eighteen Months After Enrollment			
Unadjusted Mean Monthly Rates per 100 enrollees	20.11	21.45	21.75
Regression Coefficients			
Raw		0.002	0.003
Demographic + Utilization Adjustment		0.012	0.019

* p<.05, ** p<.01, ***p<.001

First 6 months n=20,603 person months; First 12 months n=37,068 person months; First 18 months n=49,841 person months

Table 59
Average Monthly Number of Preventable Hospital Admissions
per 100 Community Dwelling Persons by Time Since Virtual MSHO Enrollment
A Cohort Analysis

	MSHO	Control-In	Control-Out
First Six Months After Enrollment			
Unadjusted Mean Monthly Rates per 100 enrollees	0.59	0.70	0.65
Regression Coefficients			
Raw		0.129	0.021
Demographic + Utilization Adjustment		0.157	0.101
First Twelve Months After Enrollment			
Unadjusted Mean Monthly Rates per 100 enrollees	0.63	0.91	0.68
Regression Coefficients			
Raw		0.310 *	0.026
Demographic + Utilization Adjustment		0.313 *	0.088
First Eighteen Months After Enrollment			
Unadjusted Mean Monthly Rates per 100 enrollees	0.71	0.92	0.76
Regression Coefficients			
Raw		0.237	0.037
Demographic + Utilization Adjustment		0.273 *	0.141

* p<.05, ** p<.01, ***p<.001

First 6 months n=20,603 person months; First 12 months n=37,068 person months; First 18 months n=49,841 person months

Table 60
Average Monthly Number of Emergency Services per 100 Community Dwelling Persons
By Time Since Virtual MSHO Enrollment
A Cohort Analysis

	MSHO	Control-In	Control-Out
First Six Months After Enrollment			
Unadjusted Mean Monthly Rates per 100 enrollees	5.56	6.03	5.58
Regression Coefficients			
Raw		0.004	0.000
Demographic + Utilization Adjustment		0.006	0.003
First Twelve Months After Enrollment			
Unadjusted Mean Monthly Rates per 100 enrollees	5.76	6.17	5.35
Regression Coefficients			
Raw		0.003	-0.004
Demographic + Utilization Adjustment		0.004	-0.001
First Eighteen Months After Enrollment			
Unadjusted Mean Monthly Rates per 100 enrollees	5.88	6.20	5.26
Regression Coefficients			
Raw		0.003	-0.005
Demographic + Utilization Adjustment		0.004	-0.001

* p<.05, ** p<.01, ***p<.001

First 6 months n=20,603 person months; First 12 months n=37,068 person months; First 18 months n=49,841 person months

Table 61
Average Monthly Number of Preventable Emergency Services
per 100 Community Dwelling Persons by Time Since Virtual MSHO Enrollment
A Cohort Analysis

	MSHO	Control-In	Control-Out
First Six Months After Enrollment			
Unadjusted Mean Monthly Rates per 100 enrollees	1.89	2.29	1.60
Regression Coefficients			
Raw		0.003	-0.003
Demographic + Utilization Adjustment		0.004	-0.002
First Twelve Months After Enrollment			
Unadjusted Mean Monthly Rates per 100 enrollees	1.75	2.46	1.56
Regression Coefficients			
Raw		0.006 **	-0.002
Demographic + Utilization Adjustment		0.007 **	-0.002
First Eighteen Months After Enrollment			
Unadjusted Mean Monthly Rates per 100 enrollees	1.89	2.42	1.71
Regression Coefficients			
Raw		0.005 **	-0.002
Demographic + Utilization Adjustment		0.006 **	-0.001

* p<.05, ** p<.01, ***p<.001

First 6 months n=20,603 person months; First 12 months n=37,068 person months; First 18 months n=49,841 person months

Table 62
Average Monthly Number of Face-to-Face Provider Visits per 100 Community Dwelling Persons
By Time Since Virtual MSHO Enrollment
A Cohort Analysis

	MSHO	Control-In	Control-Out
First Six Months After Enrollment			
Unadjusted Mean Monthly Rates per 100 enrollees	83.95	114.32	105.39
Regression Coefficients			
Raw		0.298 ***	0.200 ***
Demographic + Utilization Adjustment		0.303 ***	0.193 ***
First Twelve Months After Enrollment			
Unadjusted Mean Monthly Rates per 100 enrollees	79.84	116.58	107.60
Regression Coefficients			
Raw		0.352 ***	0.261 ***
Demographic + Utilization Adjustment		0.354 ***	0.260 ***
First Eighteen Months After Enrollment			
Unadjusted Mean Monthly Rates per 100 enrollees	79.50	121.60	107.44
Regression Coefficients			
Raw		0.398 ***	0.257 ***
Demographic + Utilization Adjustment		0.411 ***	0.275 ***

* p<.05, ** p<.01, ***p<.001

First 6 months n=20,603 person months; First 12 months n=37,068 person months; First 18 months n=49,841 person months

      Tables 63 through 68 indicate the results of the utilization cohort analyses for the nursing home population. Again, consistent with the cross sectional analyses there were significant differences between the MSHO cohort and the Control-In cohort across all services looked at and across most services compared to the Control-Out group. MSHO nursing home enrollees had significantly fewer hospital admissions than either control group with or with out adjustment and across all duration of enrollment. MSHO enrollees had significantly fewer hospital days than the Control-In group with and without adjustment across all durations of enrollment. The MSHO cohort had significantly fewer preventable hospitalizations after 12 and 18 months of enrollment than the Control-In group. MSHO enrollees had significantly fewer emergency room visits, preventable emergency room visits and face-to-face physician visits than either control group, with and without adjustment with any duration of enrollment.

Table 63
Average Monthly Number of Hospital Admissions per 100 Nursing Home Dwelling Persons
By Time Since Virtual MSHO Enrollment
A Cohort Analysis

	MSHO	Control-In	Control-Out
First Six Months After Enrollment			
Unadjusted Mean Monthly Rates per 100 enrollees	3.02	3.97	3.92
Regression Coefficients			
Raw		0.291 ***	0.277 ***
Demographic + Utilization Adjustment		0.282 ***	0.289 ***
First Twelve Months After Enrollment			
Unadjusted Mean Monthly Rates per 100 enrollees	3.07	4.24	3.56
Regression Coefficients			
Raw		0.324 ***	0.185 **
Demographic + Utilization Adjustment		0.283 ***	0.173 **
First Eighteen Months After Enrollment			
Unadjusted Mean Monthly Rates per 100 enrollees	2.90	4.10	3.33
Regression Coefficients			
Raw		0.343 ***	0.171 **
Demographic + Utilization Adjustment		0.289 ***	0.164 **

* p<.05, ** p<.01, ***p<.001

First 6 months n=30,519 person months; First 12 months n=50,689 person months; First 18 months n=63,637 person months

Table 64
Average Monthly Number of Hospital Days per 100 Nursing Home Dwelling Persons
By Time Since Virtual MSHO Enrollment
A Cohort Analysis

	MSHO	Control-In	Control-Out
First Six Months After Enrollment			
Unadjusted Mean Monthly Rates per 100 enrollees	17.19	21.74	19.41
Regression Coefficients			
Raw		0.047 *	0.020
Demographic + Utilization Adjustment		0.048 *	0.025
First Twelve Months After Enrollment			
Unadjusted Mean Monthly Rates per 100 enrollees	16.52	22.84	18.40
Regression Coefficients			
Raw		0.062 ***	0.020
Demographic + Utilization Adjustment		0.056 ***	0.019
First Eighteen Months After Enrollment			
Unadjusted Mean Monthly Rates per 100 enrollees	15.84	22.13	16.76
Regression Coefficients			
Raw		0.063 ***	0.013
Demographic + Utilization Adjustment		0.053 ***	0.013

* p<.05, ** p<.01, ***p<.001

First 6 months n=30,519 person months; First 12 months n=50,689 person months; First 18 months n=63,637 person months

Table 65
Average Monthly Number of Preventable Hospital Admissions
per 100 Nursing Home Dwelling Persons by Time Since Virtual MSHO Enrollment
A Cohort Analysis

	MSHO	Control-In	Control-Out
First Six Months After Enrollment			
Unadjusted Mean Monthly Rates per 100 enrollees	0.59	0.66	0.60
Regression Coefficients			
Raw		0.110	0.037
Demographic + Utilization Adjustment		0.090	0.036
First Twelve Months After Enrollment			
Unadjusted Mean Monthly Rates per 100 enrollees	0.47	0.76	0.53
Regression Coefficients			
Raw		0.387 **	0.124
Demographic + Utilization Adjustment		0.322 *	0.099
First Eighteen Months After Enrollment			
Unadjusted Mean Monthly Rates per 100 enrollees	0.44	0.73	0.56
Regression Coefficients			
Raw		0.429 ***	0.206
Demographic + Utilization Adjustment		0.354 **	0.192

* p<.05, ** p<.01, ***p<.001

First 6 months n=30,519 person months; First 12 months n=50,689 person months; First 18 months n=63,637 person months

Table 66
Average Monthly Number of Emergency Services per 100 Nursing Home Dwelling Persons
By Time Since Virtual MSHO Enrollment
A Cohort Analysis

	MSHO	Control-In	Control-Out
First Six Months After Enrollment			
Unadjusted Mean Monthly Rates per 100 enrollees	4.26	6.08	5.96
Regression Coefficients			
Raw		0.018 ***	0.017 ***
Demographic + Utilization Adjustment		0.018 ***	0.018 ***
First Twelve Months After Enrollment			
Unadjusted Mean Monthly Rates per 100 enrollees	4.24	6.47	5.45
Regression Coefficients			
Raw		0.022 ***	0.013 ***
Demographic + Utilization Adjustment		0.020 ***	0.013 ***
First Eighteen Months After Enrollment			
Unadjusted Mean Monthly Rates per 100 enrollees	4.05	6.22	5.19
Regression Coefficients			
Raw		0.022 ***	0.013 ***
Demographic + Utilization Adjustment		0.019 ***	0.013 ***

* p<.05, ** p<.01, ***p<.001

First 6 months n=30,519 person months; First 12 months n=50,689 person months; First 18 months n=63,637 person months

Table 67
Average Monthly Number of Preventable Emergency Services
per 100 Nursing Home Dwelling Persons by Time Since Virtual MSHO Enrollment
A Cohort Analysis

	MSHO	Control-In	Control-Out
First Six Months After Enrollment			
Unadjusted Mean Monthly Rates per 100 enrollees	1.83	2.34	2.56
Regression Coefficients			
Raw		0.005 *	0.007 ***
Demographic + Utilization Adjustment		0.005 *	0.007 ***
First Twelve Months After Enrollment			
Unadjusted Mean Monthly Rates per 100 enrollees	1.72	2.61	2.45
Regression Coefficients			
Raw		0.008 ***	0.008 ***
Demographic + Utilization Adjustment		0.008 ***	0.007 ***
First Eighteen Months After Enrollment			
Unadjusted Mean Monthly Rates per 100 enrollees	1.73	2.59	2.34
Regression Coefficients			
Raw		0.008 ***	0.007 ***
Demographic + Utilization Adjustment		0.007 ***	0.006 ***

* p<.05, ** p<.01, ***p<.001

First 6 months n=30,519 person months; First 12 months n=50,689 person months; First 18 months n=63,637 person months

Table 68
Average Monthly Number of Face to Face Provider Visits per 100 Nursing Home Dwelling
Persons by Time Since Virtual MSHO Enrollment
A Cohort Analysis

	MSHO	Control-In	Control-Out
First Six Months After Enrollment			
Unadjusted Mean Monthly Rates per 100 enrollees	97.90	129.07	153.23
Regression Coefficients			
Raw		0.298 ***	0.542 ***
Demographic + Utilization Adjustment		0.302 ***	0.554 ***
First Twelve Months After Enrollment			
Unadjusted Mean Monthly Rates per 100 enrollees	89.73	131.39	152.87
Regression Coefficients			
Raw		0.386 ***	0.612 ***
Demographic + Utilization Adjustment		0.380 ***	0.614 ***
First Eighteen Months After Enrollment			
Unadjusted Mean Monthly Rates per 100 enrollees	87.93	131.28	151.68
Regression Coefficients			
Raw		0.403 ***	0.619 ***
Demographic + Utilization Adjustment		0.393 ***	0.620 ***

* $p<.05$, ** $p<.01$, *** $p<.001$

First 6 months n=30,519 person months; First 12 months n=50,689 person months; First 18 months n=63,637 person months

Table 69 summarizes the results across these core variables for the cross sectional and cohort analyses. Again the results are essentially the same using the two methods. There were only four comparisons out of 48 comparisons made (approximately 8%) where the results were not the same; hospital days and emergency room services for the community population were significant using the cross section method compared to the Control-Out group but was not significant when compared to the same group using the cohort method of analysis. The plus (+) sign indicates that the control group had more of a particular service than the MSHO group and the asterisks indicate the level of significance.

Table 69
Comparison of Cross-sectional and Cohort Utilization Results

	Significant Findings			
	Cross-section		Cohort (12 months)	
	Control-In	Control-Out	Control-In	Control-Out
COMMUNITY				
Hospital admissions	NS	NS	NS	NS
Hospital Days	+ **	+ ***	NS	NS
Preventable Hospital Admissions	NS	NS	+ *	NS
ER Services	NS	- *	NS	NS
Preventable ER Services	+ **	NS	+ **	NS
Provider Contacts	+ ***	+ ***	+ ***	+ ***
NURSING HOME				
Hospital admissions	+ ***	+ *	+ ***	+ **
Hospital Days	+ ***	NS	+ ***	NS
Preventable Hospital Admissions	+ **	NS	+ *	NS
ER Services	+ ***	+ ***	+ ***	+ ***
Preventable ER Services	+ ***	+ ***	+ ***	+ ***
Provider Contacts	+ ***	+ ***	+ ***	+ ***

+ (positive) means control group is greater than MSHO; - (negative) means control group is less than MSHO

* p<.05, ** p<.01, ***p<.001

compared using the fully adjusted demographic plus prior utilization model

Cost Analysis

Costs for purposes of this analysis refer to the cost to the government (Federal or State) for the provision of acute and long-term care services. In the case of MSHO this means a Medicaid capitation payment, a Medicare capitation payment and where applicable direct reimbursement to providers for nursing home services on a fee-for-service basis. For the control group the cost to the government includes a Medicaid capitation payment, Medicare fee-for-service payments and may include elderly waiver claims and fee-for-service nursing home payments.

The total cost to the government for MSHO was calculated based on the actual Medicaid capitation (including the applicable PMAP rate, nursing facility add on and average monthly elderly waiver payment appropriate to each rate cell) per member per month, averaged across twelve months for each year 1998, 1999 and 2000. Similarly the actual Medicare capitation rate paid by the government per member per month was averaged over 12 months for each year 1998, 1999 and 2000. In some cases the State of Minnesota also paid fee-for-service nursing home claims for some MSHO members. This amount is broken out separately from the capitation payments. There is no attempt to track capitations per member per month with actual service utilization using encounter data.

Control group costs were calculated by identifying PMAP capitation payments per month as well as actual paid claims per member per month by payor – Medicaid, Medicare and elderly waiver. These costs were summed and averaged over 12 months for each year 1998, 1999 and 2000. If a service was paid for through fee-for-service (not included in the PMAP capitation), we used service from date and service to date to attribute the FFS payment to a given month. If the FFS service from date and service to date spanned more than one month (this primarily affected fee-for-service nursing home claims), we took the total dollar amount and averaged it across each month covered by the service dates attached to the claim. Our focus again, was on total cost to the government per member per month.

The total monthly costs of Medicare and Medicaid were adjusted by the demographic factors and prior health care utilizations of dually eligible enrollees used previously in the utilization analyses. Two ordinary least square (OLS) regressions were fitted for community residents and nursing home residents by years. In addition, regressions were also fitted for a subgroup of community residents, the community frail. The Control-In group (PMAP) was compared to MSHO group (reference group). We did not compare MSHO to the Control-Out group due to geographic variations that would impact both the capitation calculation for MSHO as well as PMAP and could impact FFS costs as well.

Table 70 and Figure 10 show the contrast in payments for each of the three years studied for community enrollees including the community frail. Because of the people in the rate cell that pays for community care at post acute care rates including the nursing facility add-on payment (rate cell B - community residents who are nursing home certifiable), the Medicaid capitation portion is considerably higher for MSHO. In each year the Medicare capitated rate for MSHO was higher than the FFS rate for the Control-In group. The difference remains significant after adjustment except in the first year 1998. The regression difference reported is the dollar difference between MSHO and the control group after adjustment. For example, in 2000 the average cost per person for MSHO enrollees was $1,610 per month. When the control group is adjusted to more closely resemble the MSHO population, the adjusted cost for the Control-In group was $1,453. The adjusted cost differences remained significant.

Table 71 and Figure 11 show the same analyses for the nursing home residents. Here the Medicaid capitation rates are more comparable because there are no special cell rates for MSHO. The Medicare capitation rates are considerably higher for MSHO. The difference in average total costs in each of the three years was significant with and without adjustment.

The MSHO community population includes a subgroup of frail elderly for which the plans receive increased Medicare payments. Since the MSHO program has a disproportionate number of nursing home certifiable persons in their population compared to the control groups costs were analyzed separately for the community dwelling frail. Table 72 shows the contrast in payments for each of the three years studied for community enrollees in MSHO in rate cell B and for the control groups enrollees

receiving Elderly Waiver services. The MSHO mean monthly cost per enrollee was not significantly different from the Control-In group until 2000 with and without adjustment.

It is important to note that MSHO Medicare capitation payments are based upon a rate structure approved by CMS using the established M+C payment rates. For Medicare cost comparisons, only the frail nursing home certifiable population (rate cell B) resulted in added per capita payments to MSHO plans. For this subgroup of community residents, MSHO Medicare costs were higher only in the last year included in this analysis. For all other populations, including those in the nursing home, MSHO plans received the same amount as they would have in the M+C program absent the demonstration. It is important to note that the Balanced Budget Act of 1997 broke the link between local Medicare fee-for-service costs and capitation payments to managed care plans. (Medicare Payment Advisory Commission, 2001). Part of the difference in Medicare costs between MSHO enrollees and the Control-In group is attributable to this policy change. Based on data from the CMS health plan's website, we calculated that in the four counties included in this analysis, per capita Medicare costs for Part A services rose from 1% to 6%, depending upon county, between 1998 and 2000, while M+C payment rates rose from 8% to 12%, depending on the county. Part B per capita Medicare costs rose at approximately the same rate during this time period from 10% to 14%, depending upon the county, compared to 11% to 16% for M+C. This data is found at http://www.cms.hhs.gov/healthplans/rates.

Table 70
Comparative Mean Monthly Costs per Enrollee for Each of Three Years
for Community Residents

	MSHO	Control-In
1998†		
-Unadjusted Mean Monthly Costs Per Enrollee	$1,296	$1,070
Medicaid	$668	$538
Medicaid Capitation (PMAP)[1]	$663	$430
Medicaid FFS (Nursing Home)[2]	$5	$72
Elderly Waiver Community Services	$0[3]	$35
Medicare Capitation/FFS	$628	$532
Part A	$371	$326
Part B	$258	$206
-Regression Differences		
Raw		-$254***
Prior Utilization + Demographic+Frailty		NA
1999‡		
-Unadjusted Mean Monthly Costs Per Enrollee	$1,426	$1,092
Medicaid	$755	$586
Medicaid Capitation (PMAP)[1]	$749	$452
Medicaid FFS (Nursing Home)[2]	$6	$67
Elderly Waiver Community Services	$0[3]	$66
Medicare Capitation/FFS	$671	$506
Part A	$395	$329
Part B	$276	$177
-Regression Differences		
Raw		-$332***
Prior Utilization + Demographic+Frailty		-$167***
2000§		
-Unadjusted Mean Monthly Costs Per Enrollee	$1,610	$1,156
Medicaid	$860	$658
Medicaid Capitation (PMAP)[1]	$843	$483
Medicaid FFS (Nursing Home)[2]	$17	$65
Elderly Waiver Community Services	$0[3]	$109
Medicare Capitation/FFS	$750	$498
Part A	$434	$314
Part B	$316	$184
-Regression Differences		
Raw		-$453***
Prior Utilization + Demographic+Frailty		-$297***

†: The N for the Raw group was 74,871 person months.
‡: The N for the Raw group was 83,190 person months. The N for the Demographic+Frailty+ Utilization group was 55,000 person months.
§: The N for the Raw group was 93,144 person months. The N for the Demographic+Frailty+ Utilization group was 61,013 person months.
*=p<.05, **=p<.01, ***=p<.001

1: Medicaid capitation for MSHO includes non-institutional PMAP rate, nursing facility add-on and average monthly elderly waiver payment amounts.
2: For MSHO Medicaid FFS payments for nursing home days occurring after the 180 days covered by nursing facility add-on.
3: Elderly waiver services for MSHO are included in Medicaid capitation.

Table 71
Comparative Mean Monthly Costs per Enrollee for Each of Three Years
for Nursing Home Residents

	MSHO	Control-In
1998†		
-Unadjusted Mean Monthly Costs Per Enrollee	$4,095	$3,660
Medicaid	$3,301	$3,083
Medicaid Capitation (PMAP)	$389	$385
Medicaid FFS (Nursing Home) [1]	$2,912	$2,698
Medicare Capitation/FFS	$793	$578
Part A	$495	$366
Part B	$298	$212
-Regression Differences		
Raw		-$384***
Prior Utilization + Demographic+NHLOS		NA
1999‡		
-Unadjusted Mean Monthly Costs Per Enrollee	$4,119	$3,643
Medicaid	$3,309	$3,089
Medicaid Capitation (PMAP)	$408	$403
Medicaid FFS (Nursing Home) [1]	$2,901	$2,686
Medicare Capitation/FFS	$810	$554
Part A	$505	$355
Part B	$305	$199
-Regression Differences		
Raw		-$450***
Prior Utilization + Demographic+NHLOS		-$494***
2000§		
-Unadjusted Mean Monthly Costs Per Enrollee	$4,472	$3,952
Medicaid	$3,594	$3,344
Medicaid Capitation (PMAP)	$436	$432
Medicaid FFS (Nursing Home) [1]	$3,158	$2,911
Medicare Capitation/FFS	$878	$608
Part A	$542	$386
Part B	$336	$222
-Regression Differences		
Raw		-$508***
Prior Utilization + Demographic+NHLOS		-$506***

†: The N for the Raw group was 87,558 person months.

‡: The N for the Raw group was 86,814 person months. The N for the Demographic+NHLOS+ Utilization group was 52,986 person months.

§: The N for the Raw group was 86,832 person months. The N for the Demographic+NHLOS+ Utilization group was 51,125 person months.

*=p<.05, **=p<.01, ***=p<.001

1: For MSHO Medicaid FFS payments for nursing home days occurring after the 180 days covered by nursing facility add-on.

Figure 10
Average Per Enrollee Per Month Costs in Community Sample
With The Control Groups Adjusted To Look More Like MSHO
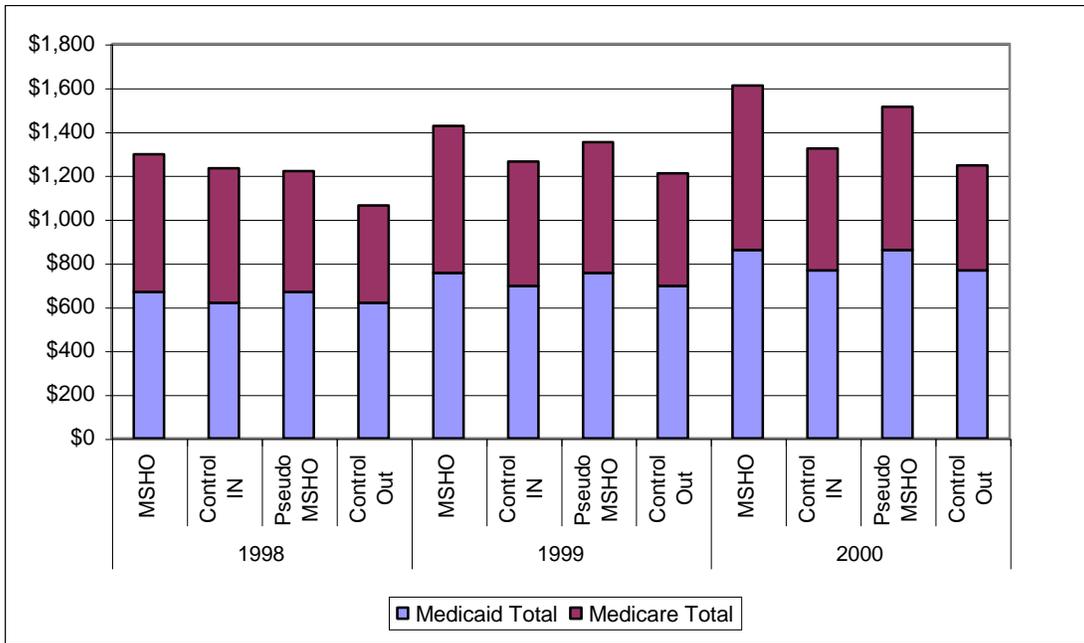
Figure 11
Average Per Enrollee Per Month Costs in Nursing Home Sample
With The Control Groups Adjusted To Look More Like MSHO
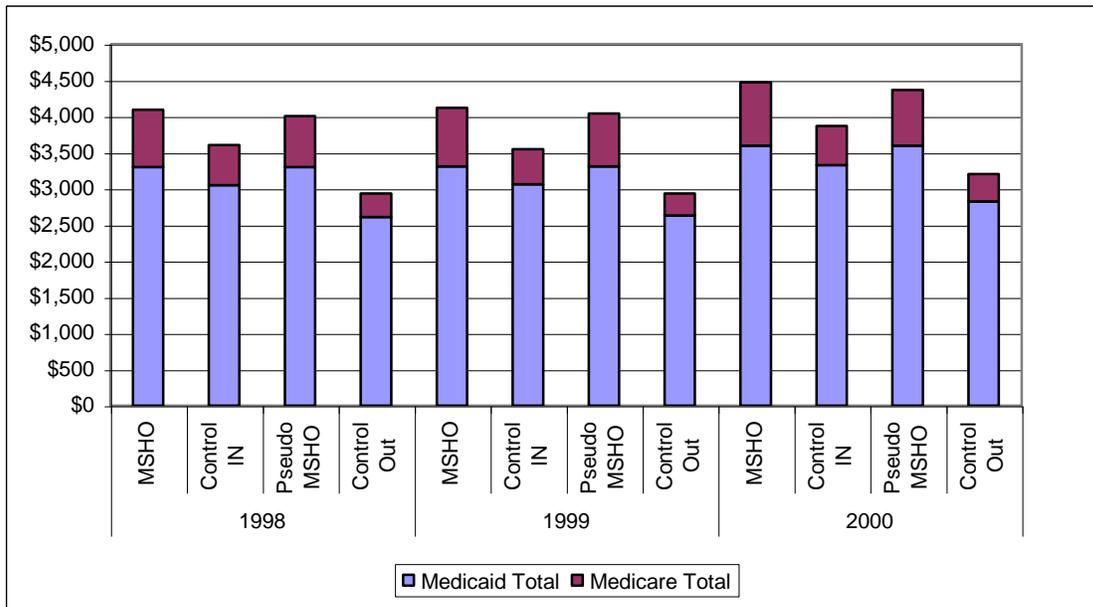
Table 72
Comparative Mean Monthly Costs per Enrollee for Each of Three Years
for Nursing Home Certifiable Community Enrollees

	MSHO	Control-In
1998†		
-Unadjusted Mean Monthly Costs Per Enrollee	$2,268	$2,313
Medicaid	$1,269	$1,078
Medicaid Captitation (PMAP) [1]	$1,259	$437
Medicaid FFS (Nursing Home) [2]	$9	$30
Elderly Waiver Community Services	$0[3]	$611
Medicare Capitation/FFS	$1,000	$1,235
Part A	$574	$754
Part B	$425	$481
-Regression Differences		
Raw		$54
Prior Utilization + Demographic		NA
1999‡		
-Unadjusted Mean Monthly Costs Per Enrollee	$2,391	$2,210
Medicaid	$1,371	$1,165
Medicaid Captitation (PMAP) [1]	$1,358	$457
Medicaid FFS (Nursing Home) [2]	$13	$18
Elderly Waiver Community Services	$0[3]	$690
Medicare Capitation/FFS	$1,020	$1,045
Part A	$585	$680
Part B	$435	$365
-Regression Differences		
Raw		-$181
Prior Utilization + Demographic		-$139
2000§		
-Unadjusted Mean Monthly Costs Per Enrollee	$2,561	$2,129
Medicaid	$1,460	$1,230
Medicaid Captitation (PMAP) [1]	$1,427	$482
Medicaid FFS (Nursing Home) [2]	$32	$22
Elderly Waiver Community Services	$0[3]	$725
Medicare Capitation/FFS	$1,101	$899
Part A	$624	$561
Part B	$477	$338
-Regression Differences		
Raw		-$450***
Prior Utilization + Demographic		-$376***

†: The N for the Raw group was 5,803 person months.

‡: The N for the Raw group was 10,301 person months. The N for the Demographic+Utilization group was 6,328 person months.

§: The N for the Raw group was 17,420 person months. The N for the Demographic+Utilization group was 9,537 person months.

*=p<.05, **=p<.01, ***=p<.001

1: Medicaid capitation for MSHO includes non-institutional PMAP rate, nursing facility add-on and average monthly elderly waiver payment amounts.
2: For MSHO Medicaid FFS payments for nursing home days occurring after the 180 days covered by nursing facility add-on.
3: Elderly waiver services for MSHO are included in Medicaid capitation.

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Quality Analysis
Mortality – Cross Sectional Analysis

We examined mortality rates for the three samples in terms of overall mortality rates and some disease-specific rates designed to reflect persons with diagnoses that might be considered preventable. Because we did not have access to the actual death records, we approximated cause of death by identifying persons who had any of a short list of diagnoses in the two weeks prior to death. Tables 73 and 74 present the overall rates expressed as deaths per 100 persons per month as well as the significance under the various adjustment options for the community and nursing home samples.

Although there are no significant differences in overall death rates or the rate of "preventable" deaths for both the community and nursing home samples, there are significant differences in the proportion of deaths with a "preventable" diagnosis. Again, these results on "preventable" deaths may be suspect in that the overall reporting of diagnoses for MSHO enrollees is lower than for PMAP enrollees.

Table 73
Monthly Death Rates for Community Sample

	MSHO	Control-In	Control-Out
Average number of deaths in a month per 100 persons	0.35	0.36	0.44
Regression coefficients			
Raw		0.019	0.216
Prior Utilization + Demographic		0.004	-0.057
Average age distribution of deaths in a month			
< = 75 years old	43.60	38.58	32.99
> 75 and <= 80 years old	21.18	20.57	24.31
> 80 and <= 85 years old	17.15	18.05	16.52
> 85 and <= 90 years old	11.61	13.40	15.39
> 90 years old	6.45	9.40	10.79
Of those who died, average percent with a "preventable" diagnosis in the two weeks prior to death			
Dehydration	5.48	12.08	10.39
Pneumonia/Influenza	5.05	17.07	17.90
UTI	4.84	8.37	4.43
Infectious Gastroenteritis	0.00	0.00	0.00
Cellulitis	3.23	0.94	1.81
Any of the Above	17.15	28.55	30.46
Regression coefficients			
Raw		0.965**	1.026**
Prior Utilization + Demographic		0.589	0.229
Average percent of the population with selected diagnoses who died in a given month			
CHF	0.81	0.82	1.01
Diabetes	0.40	0.45	0.52
COPD	0.80	0.77	0.81
Hypertension	0.43	0.38	0.41
Angina	0.41	0.45	0.58
Any of the Above	0.48	0.43	0.52
Regression coefficients			
Raw		-0.117	0.069
Prior Utilization + Demographic		-0.096	-0.098

Average number of deaths – N for the raw adjustment was 251,205; N for the demographic plus prior utilization adjustment was 116,013

Rate Deaths with preventable diagnosis - N for the raw adjustment was 929; N for the demographic plus prior utilization adjustment was 429

Average percent of the population with selected diagnoses who died in a given month – N for the raw adjustment was 174,298; N for the demographic plus prior utilization adjustment was 80,719

*=p<.05, **=p<.01, ***=p<.001

Table 74
Monthly Death Rates for Nursing Home Sample

	MSHO	Control-In	Control-Out
Average number of deaths in a month per 100 persons	2.60	2.66	2.71
Regression coefficients			
Raw		0.022	0.042
Prior Utilization + Demographic		0.082	0.000
Average age distribution of deaths in a month			
< = 75 years old	7.97	11.91	6.68
> 75 and <= 80 years old	9.65	10.64	9.66
> 80 and <= 85 years old	15.61	18.08	17.18
> 85 and <= 90 years old	25.09	23.24	27.05
> 90 years old	41.69	36.14	39.44
Of those who died, average percent with a "preventable" diagnosis in the two weeks prior to death			
Dehydration	4.67	6.72	6.92
Pneumonia/Influenza	9.24	14.83	12.83
UTI	4.29	9.02	7.73
Infectious Gastroenteritis	0.00	0.00	0.00
Cellulitis	0.61	1.19	0.87
Any of the Above	13.36	24.49	21.43
Regression coefficients			
Raw		0.738***	0.564***
Prior Utilization + Demographic		0.714***	0.548***
Average percent of the population with selected diagnoses who died in a given month			
CHF	3.15	3.18	3.18
Diabetes	2.56	2.48	2.63
COPD	2.94	2.91	3.25
Hypertension	2.33	2.39	2.43
Angina	2.94	2.77	2.68
Any of the Above	2.57	2.64	2.72
Regression coefficients			
Raw		0.021	0.054
Prior Utilization + Demographic		0.077	-0.013

Average number of deaths – N for the raw adjustment was 261,204; N for the demographic plus prior utilization adjustment was 104,111

Rate Deaths with preventable diagnosis - N for the raw adjustment was 6,926; N for the demographic plus prior utilization adjustment was 2,835

Average percent of the population with selected diagnoses who died in a given month – N for the raw adjustment was 194,083; N for the demographic plus prior utilization adjustment was 76,387

*=p<.05, **=p<.01, ***=p<.001

Mortality – Cohort Analysis

We examined mortality rates for the community and nursing home cohorts developed for the utilization analysis in terms of overall mortality rates. There was no difference with or without adjustment in the predicted time to death between MSHO enrollees and either control group for either the community or nursing home cohort. Table 75 presents the regression coefficients for the community cohort and Table 76 presents the same information for the nursing home cohort. Figures 12 and 13 present the hazard functions for the community and nursing home cohorts respectively.

Table 75
Comparison of Rates of Death by Community Cohort

	MSHO	Control-In	Control-Out
Rates of Death	8.4%	9.8%	9.3%
Regression Coefficients			
Raw		0.182	0.200
Demographic + Utilization Adjustment		0.221	0.225

*=p<.05, **=p<.01, ***=p<.001

Table 76
Comparison of Rates of Death by Nursing Home Cohort

	MSHO	Control-In	Control-Out
Rates of Death	21.3%	31.8%	29.5%
Regression Coefficients			
Raw		0.038	-0.100
Demographic + Utilization Adjustment		0.026	-0.098

*=p<.05, **=p<.01, ***=p<.001

Figure 12
Hazard Function for Deaths in Community Dwelling Cohort


months
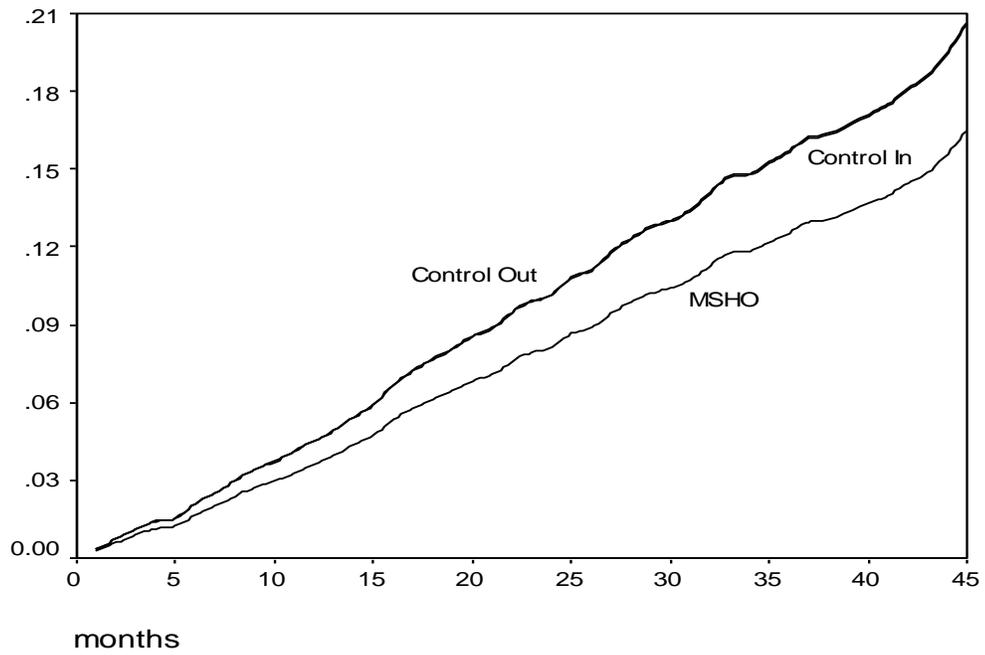
Figure 13
Hazard Function for Deaths in Nursing Home Cohort

Months
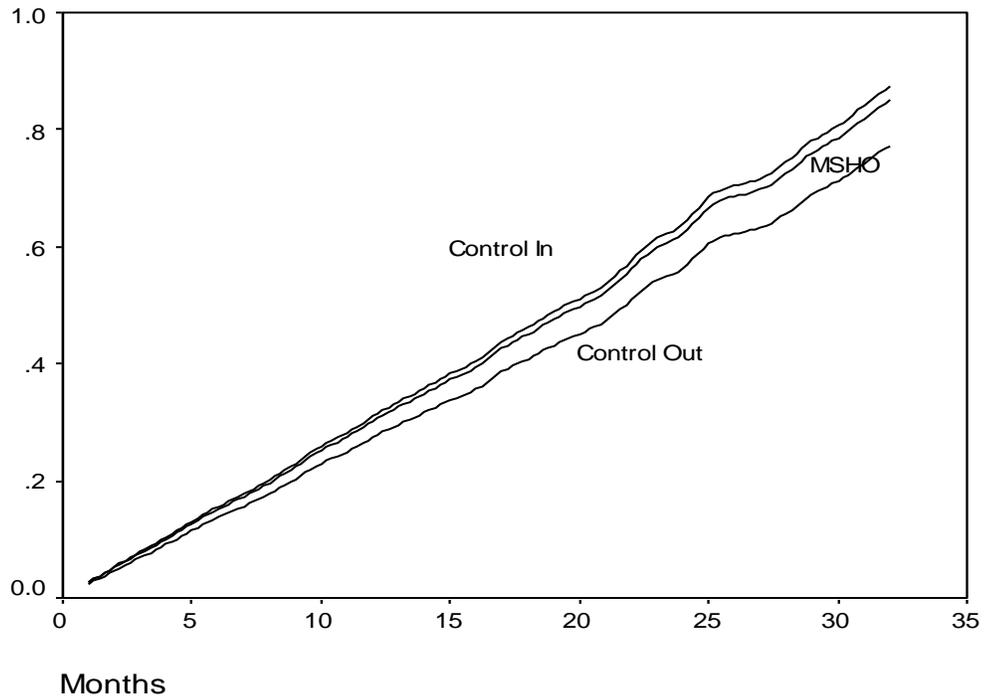
Change in Functional Status

One measure of quality among nursing home residents can be seen in the rate of change of their functional status. We used MDS data to examine the change in ADLs for nursing home residents in MSHO and the two control groups. MDS records were available between June 1998 and December 2000. We selected all admission, quarterly and annual records from the MDS during that period of time and excluded all discharge records as they did not have any data on ADLs. We also excluded residents who had only one MDS record during this time period. For residents who had more than two records, the first and the last records were selected for the analysis. Finally, we excluded residents who were totally dependent in all of the Morris ADL items or who were comatose as reported in the first records. We matched these MDS records to either the MSHO group or one of the two control groups (Control-In or Control-Out), using the information on MSHO enrollment between 1997 and 2000.

We created the Morris ADL indicators using data from section G (physical functioning and structural problems) of the MDS (Morris et al., 1999) The Morris ADLs indicator ranged between 0 (totally independent) and 28 (totally dependent). We also created the changes in ADLs between the first and last records for each resident.

Table 77 shows the mean scores of Morris ADLs for the first and last records and their difference. Table 78 shows the results of OLS regression on the changes in ADLs between the first and the last records. We presented both the unadjusted and the adjusted models. We also presented the facility-adjusted model (comprehensive model), which adjusted for all variables in the adjusted model plus dummy variables for the nursing home facilities. Because the nursing homes in the Control-Out locations were by definition different from those in the MSHO area, we did not present the facility-adjusted model for the Control-Out group. There were no MSHO enrollees and Control-Out enrollees living in the same facilities, whereas MSHO and Control-In enrollees could live in the same nursing home or different nursing homes making place of residence a factor in the care received. The decline in ADLs is more for controls compared to MSHO.

Table 77
Descriptive Statistics for ADLs and Change in ADLs by MSHO Status

	MSHO	Control-In	Control-Out
Sample Size	3,510	4,869	2,391
Morris ADLs 1st Record	14.1	13.5	14.7
Morris ADLs Last Record	16.2	16.2	17.6
Morris ADLs change	2.2	2.8	3.0

Table 78
Results of OLS Regression on Change in ADLs by MSHO Status

	No Adjustment		Basic Adjustment		Comprehensive Adjustment	
	Control-In	Control-Out	Control-In	Control-Out	Control-In	Control-Out
Morris ADLs change	0.61***	0.61***	0.31*	0.51**	0.31*	N/A

Basic adjustment: Age, gender, race, and baseline ADLs (Morris et al., 1999), length of stay, and difference between assessment dates
Comprehensive adjustment: Basic adjustment plus facilities.
*=p<.05, **=p<.01, ***=p<.001

Nursing Home Admissions

      Using the same cohorts developed for the utilization analysis we looked at time to nursing home admission for those individual enrolled into MSHO while living in the community. We also looked at the subsequent length of nursing home admission dividing the groups into nursing home lengths of stay of less than 30 days, greater than 60 days, and greater than 90 days.

      The overall nursing home admission rates are shown in Table 79 and Figures 14-16. The MSHO cohort has fewer short-stay admissions than either the Control-In or Control-Out cohorts. This difference is significant with and without adjustment. MSHO has fewer admissions to the nursing home of 60 days or longer compared to the Control-Out cohort after adjustment. There is no difference between the groups for nursing home admissions of 90 days or longer.

Table 79
Comparison of Rates of Nursing Home Admission for Community Cohort by Length of Nursing Home Stay

	MSHO	Control-In	Control-Out
Nursing Home Stay less than 30 days			
Rates of Nursing Home Admission	4.0%	6.0%	7.5%
Regression Coefficients			
Raw		0.403*	0.622***
Demographic + Utilization Adjustment		0.397*	0.675***
Nursing Home Stay more than 60 days			
Rates of Nursing Home Admission	5.9%	5.7%	7.6%
Regression Coefficients			
Raw		-0.038	0.249
Demographic + Utilization Adjustment		-0.016	0.353*
Nursing Home Stay more than 90 days			
Rates of Nursing Home Admission	5.4%	4.7%	6.1%
Regression Coefficients			
Raw		-0.153	0.119
Demographic + Utilization Adjustment		-0.146	0.224

*=p<.05, **=p<.01, ***=p<.001

Figure 14
Hazard Function of Nursing Home Admissions of 30 days or less
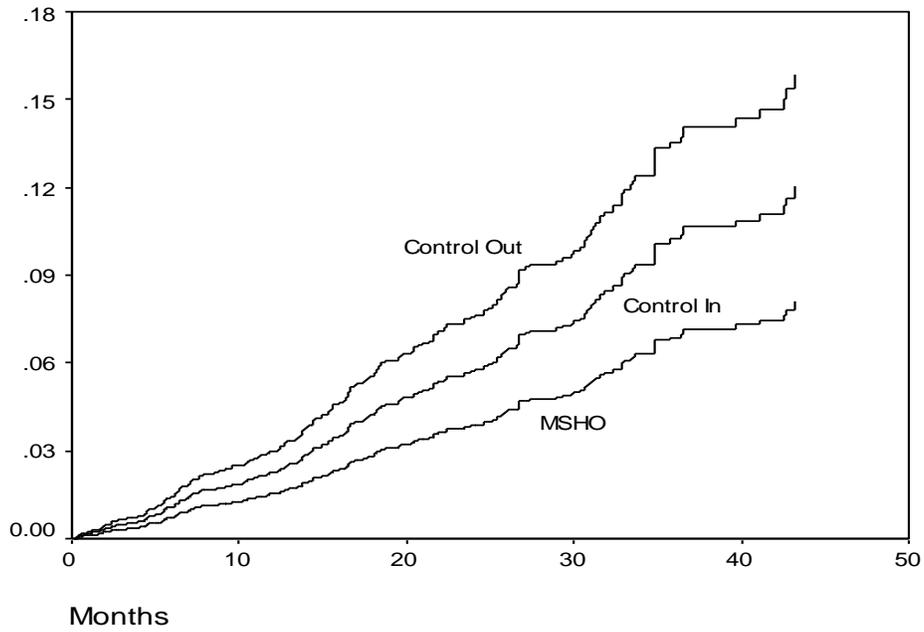
Figure 15
Hazard Function of Nursing Home Admissions of 60 days or more

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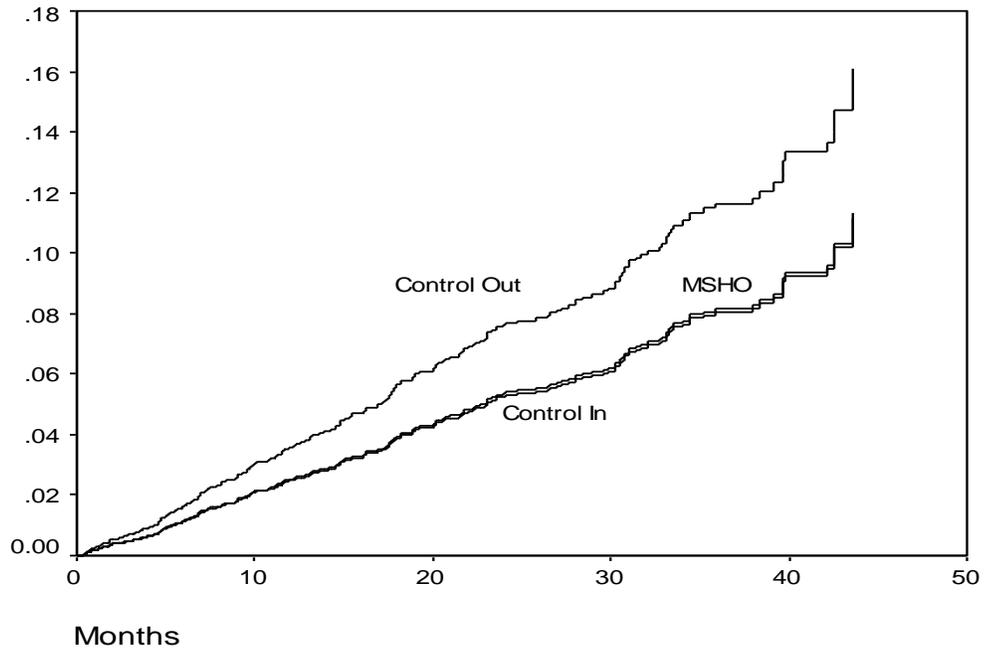
Figure 16
Hazard Function of Nursing Home Admissions of 90 days or more
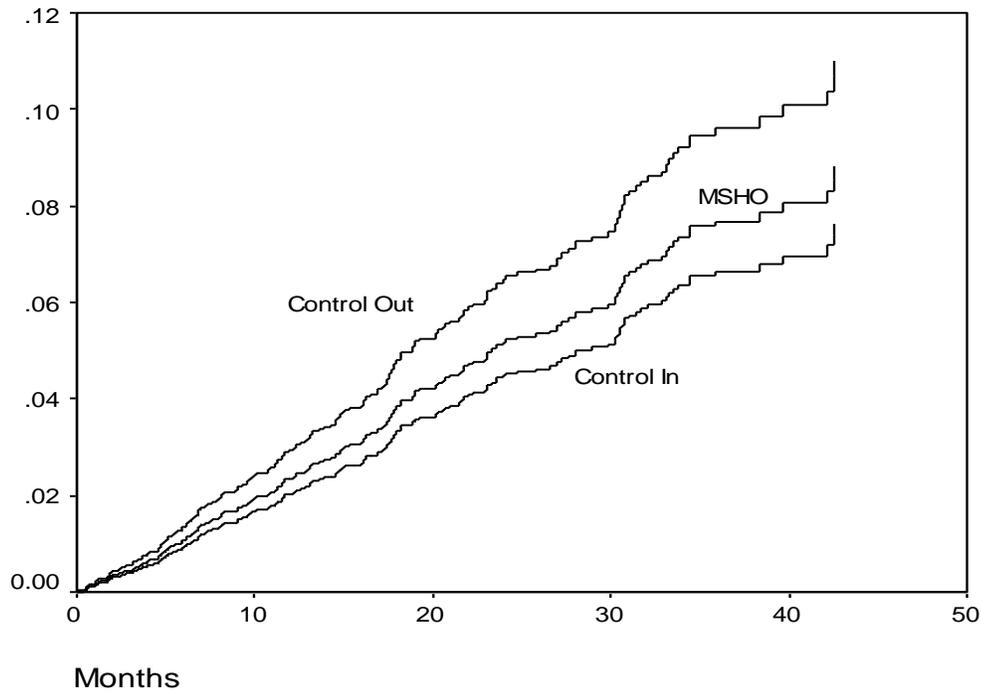
Nursing Home Discharges

      To assess the rate of discharges from nursing homes, we applied a variant of survival analysis (Cox regression). We examined all residents admitted prior to December 2000. Length of stay (LOS) of residents that were not discharged prior to December 2000 was considered as right-censored and calculated based on the final observation date (December 2000).

      We made a series of separate analyses: 1) all discharges, 2) successful discharges (defined as those who were discharged to the community, were not hospitalized or placed into nursing home within the first month, and survived that first month), and 3) unsuccessful discharges (defined as persons who were discharged dead or who died or were hospitalized within 30 days of discharge).

      For the first analysis we included all discharges and censored cases (those individuals who were still in the nursing home on the last days of our observations in December 2000 were considered as right censored). The analysis of successful discharges included only successful discharges and censored cases. (The unsuccessful group was omitted.) Likewise, the analysis of unsuccessful discharges was based on unsuccessful discharges and censored cases. (The successful group was omitted.) To separate the patterns for short-stay and long-stay residents, we examined separately various cohorts defined by LOS. In each analysis we compared MSHO to the two control groups. Risk-

adjustment variables included age at discharge and gender. We also tested stability of our observations to the admission date and found it to be high.

The results of these analyses are shown in Table 80 and Figure 17. Separate analyses are shown for short-stay residents defined as 30 days or less and various lengths of stay beyond that point. For all discharges the pattern shifts with the LOS cohort. There is no significant difference for those 30 days or less, but for those 60 days or less, the controls have lower rates of discharge (and, therefore, higher LOS). However, for longer stay residents, defined at various thresholds of LOS, the MSHO residents have significantly lower rates of discharge (longer LOS). When the successful discharges are examined, the patters are not as clear. Only the Control-Out group had a significantly lower discharge rate than the MSHO at 60 days or less. The MSHO discharge rate was significantly greater than the controls when all stays over 60 days were considered, but when longer stays (length of stay longer than 365 days or LOS greater than 730 days) were analyzed, the significant difference applied to only the Control-In group. For the unsuccessful discharges there were no significant differences for short-stay residents, but the likelihood of discharge was greater among both control groups for each long-stay LOS cohort.

Table 80
Risk of Discharge by Length of Stay of NH Residents by Type of Discharge

	All Discharges		Successful Discharges		Unsuccessful Discharges	
	Regression Coefficient	Significance	Regression Coefficient	Significance	Regression Coefficient	Significance
	LOS<=30 days					
Control-In	-0.032	0.738	0.019	0.877	-0.013	0.938
Control-Out	-0.145	0.214	-0.190	0.197	0.082	0.677
	LOS<=60 days					
Control-In	-0.169	0.051	-0.110	0.300	-0.269	0.078
Control-Out	-0.316	0.002	-0.338	0.009	-0.275	0.126
	LOS>60 days					
Control-In	0.388	0.000	0.638	0.000	0.355	0.000
Control-Out	0.257	0.000	0.240	0.000	0.273	0.000
	LOS>365 days					
Control-In	0.317	0.000	0.632	0.000	0.293	0.000
Control-Out	0.277	0.000	0.348	0.112	0.273	0.000
	LOS>730 days					
Control-In	0.257	0.000	0.461	0.044	0.245	0.000
Control-Out	0.216	0.006	0.315	0.263	0.205	0.013

Figure 17
Cumulative Frequency of Discharges as a Function of LOS (By Types of Stays and Discharges)
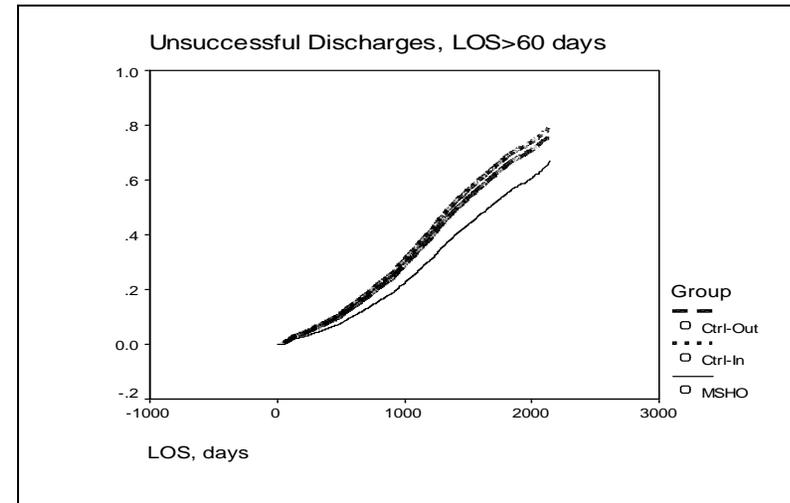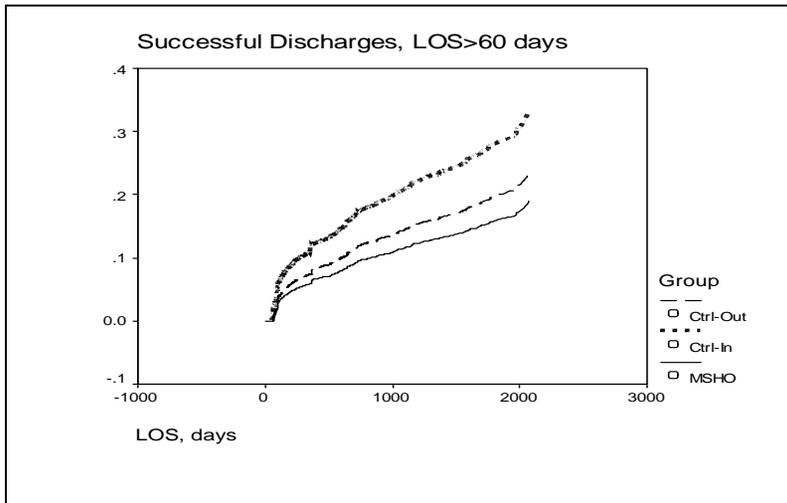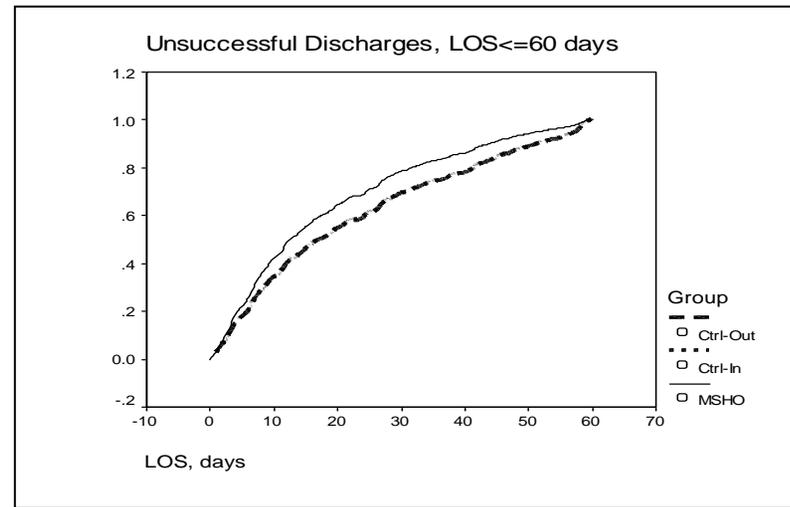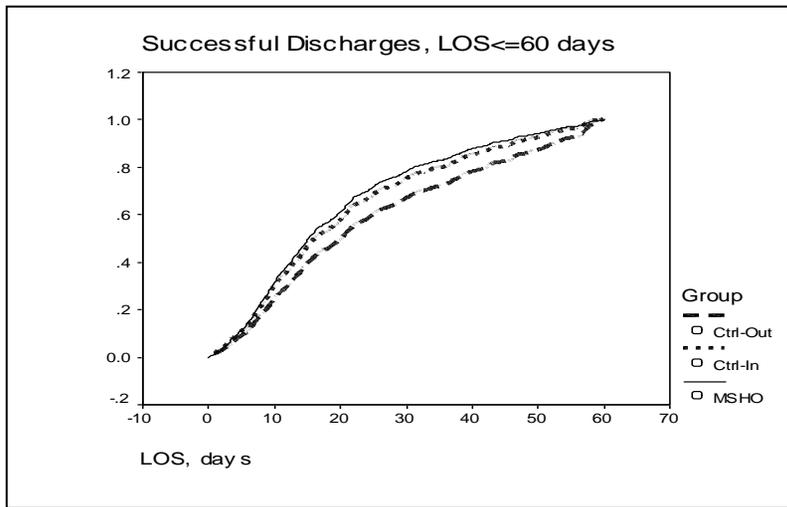
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We also used MDS records to study the percentage of successful discharges (discharges to community with no expectation of return to nursing home) between MSHO and the two control groups. The final sample size was 14,333 residents. Among those 14,333 residents discharged, 409 were discharged to community. Table 81 summarizes the percentage of discharges by MSHO status. We also conducted logistic regression analyses on the likelihood of discharge by MSHO status. Table 82 presents the odds ratios from these logistics regression analyses.

Table 81 shows that 1) the percentage of discharges to the community were very low, ranging from 2.3% to 3.06% during the two and half year period and 2) residents in the two controls were more likely to be discharged to the community than residents in the MSHO group. Table 82 shows that the odds ratio was statistically significant at the 0.05 level for the Control-In group before risk adjustment. When adjusted for variables listed in risk adjustment 1, the odds ratio for the Control-In group became non-significant while the odds ratio for the Control-Out group became statistically significant at the .05 level. However, when the length of nursing home stay was added into the regression (risk adjustment 2), the odds ratio for both Control-In and Control-Out became statistically non-significant. Therefore, we may conclude that there is no significant difference in community discharge rates between the MSHO and two controls, after adjusting for age, race, gender, Morris ADLs, and length of stay in nursing home.

Table 81
Percentage of Discharge by MSHO Status

	N	%
Experimental	3,733	2.30
Control-In	7,523	3.06
Control-Out	3,077	3.02

Table 82
Odds Ratios from Logistics Regression Analyses

	No Adjustment	Risk Adjustment 1	Risk Adjustment 2
Control-In	1.34*	1.27	0.85
Control-Out	1.32	1.36*	0.77

Variables for Risk adjustment 1: Age, white, female, and Morris ADLs score.

Variables for Risk adjustment 2: Age, white, female, Morris ADLs score, and the difference between nursing home admission date and discharge date (for residents who were not discharged, the difference between nursing home admission date and 12/31/2000 was used).

*=p<.05, **=p<.01, ***=p<.001

<u>Nursing Home Quality Indicators</u>

   Table 83 shows the frequencies of the 24 QIs expressed as a percent. Table 84 shows the results of the regression models expressed as odds ratios. The MSHO group was used as the reference group in these regression analyses. Therefore, an odds ratio greater than 1 favored MSHO (MSHO had better "quality"), while an odds ratio lower than 1 favored the controls. An odds ratio greater than 1 indicates that one is more likely to see that QI in the control group than in MSHO and an odds ratio less than 1 indicates that one is less likely to see that QI in the control group. Quality Indicators indicates either potentially poor care practices or outcomes of care. In general, the level of adjustment did not have a substantial impact on the results. The rates of significant differences between MSHO and either control were modest and did not reveal a strong direction. For example, in Period 1 there were 12 significant odds ratios greater than 1 and 11 less than 1. The generally low rate of significant differences in part reflects the low incidence or prevalence of the events. In general, the results suggest that there were no impressive quality differences between the MSHO clients and those in the control groups.

Table 83
Frequency of Occurrence for the Quality Indicators (in percent)

		Period 1			Period 2			Period 3		
		MSHO	CI	CO	MSHO	CI	CO	MSHO	CI	CO
QI1	New fractures	1.2	1.0	1.3	1.7	1.5	0.5	0.8	1.6	1.4
QI2	Prevalence of falls	16.3	20.4	18.2	17.2	18.6	19.3	16.1	18.0	18.4
QI3	Behavioral symptoms affecting others	46.2	38.6	43.6	50.0	42.8	39.1	50.0	46.8	42.4
QI4	Symptoms of depression	18.8	16.3	14.6	21.6	16.0	15.1	21.3	17.9	15.5
QI5	Depression without antidepressant therapy	7.7	8.2	8.0	10.5	7.9	6.2	12.4	9.1	7.6
QI6	Use of 9 or more different medications	43.9	46.7	41.0	41.9	41.5	43.9	40.9	38.2	38.7
QI7	Incidence of new diagnosis of cognitive impairment	13.3	12.5	4.6	10.8	12.9	10.5	9.4	11.3	8.7
QI8	Prevalence of bladder or bowel incontinence	63.9	57.4	57.4	64.4	58.2	56.8	66.5	61.7	61.4
QI9	Occasional incontinence without toileting plan	55.7	62.5	60.1	55.3	62.2	62.0	57.1	59.6	54.8
QI10	Prevalence of indwelling catheters	3.5	4.1	4.2	3.0	3.9	3.7	3.1	3.9	4.0
QI11	Prevalence of fecal impaction	0.3	0.3	0.5	0.9	0.3	0.5	0.3	0.7	0.4
QI12	Prevalence of urinary tract infections	5.3	8.1	7.8	5.0	6.3	7.6	5.7	5.4	6.0
QI13	Prevalence of weight loss	6.8	9.2	8.3	8.5	7.8	8.1	7.7	8.9	9.1
QI14	Prevalence of tube feeding	2.1	3.0	1.7	2.3	1.9	1.7	2.1	2.5	1.9
QI15	Prevalence of dehydration	0.6	0.6	0.7	0.5	0.4	0.5	0.4	0.5	0.3
QI16	Prevalence of bedfast residents	1.4	1.7	1.2	1.5	1.3	0.3	1.3	1.8	1.3
QI17	Incidence of decline in late loss ADLs	14.2	15.3	14.8	15.4	15.9	15.7	14.2	15.0	13.5
QI18	Incidence of decline in ROM	7.4	8.2	10.7	7.5	9.9	11.8	7.8	9.5	10.6
QI19	Antipsychotic use w/no psychotic related conditions	18.8	17.1	20.8	18.5	18.5	17.2	18.8	20.4	15.0
QI20	Prevalence of anti-anxiety/ hypnotic use	13.8	17.2	20.8	15.8	15.0	17.6	15.8	14.7	16.0
QI21	Hypnotic use more than 2 times in the last week	1.2	2.3	2.4	1.5	1.3	1.2	1.3	1.7	2.1
QI22	Daily physical restraints	4.5	4.3	3.3	6.3	3.6	4.5	6.3	5.6	4.8
QI23	Prevalence of little or no activity	15.0	15.9	16.5	16.4	16.9	15.4	19.3	19.7	24.2
QI24	Prevalence of stage 1-4 pressure ulcers	6.3	6.5	6.4	5.9	5.7	6.4	5.8	5.5	5.6

CI = Control-In

CO = Control-Out

Quality indicators (QIs), developed by researchers at the Center for Health Systems Research and Analysis at the University of Wisconsin-Madison, are markers that indicate prevalence of potentially poor care practices or outcomes. The denominators used for QIs are either all residents on most recent assessment or a subset of residents who did not have the poor outcomes on the previous assessment. Detailed information on the numerator and denominator used for each QI is found in Appendix E.

Table 84
Odds Ratios from Three Different Regression Models for Periods 1, 2, and 3

		Period 1						Period 2						Period 3					
		No Adj		Min Adj		Com Adj		No Adj.		Min Adj.		Com Adj		No Adj		Min Adj		Com Adj	
		CI	CO	CI	CO	CI	CO	CI	CO	CI	CO	CI	CO	CI	CO	CI	CO	CI	CO
QI1	New fractures	0.82	1.04	0.70	1.40	0.74	1.66	0.87	0.29*	0.85	0.33	0.77	0.25*	2.07*	1.83	2.07	2.11	1.84	1.95
QI2	Prevalence of falls	1.31*	1.14	1.35*	1.18	1.28	1.00	1.10	1.16	1.10	1.13	1.08	1.17	1.14	1.18	1.16	1.19	1.07	1.11
QI3	Behavioral symptoms affecting others	0.73***	0.90	0.76**	0.85	0.83	0.98	0.75***	0.64***	0.77**	0.69**	0.80*	0.75*	0.88	0.73***	0.87	0.80*	0.89	0.80*
QI4	Symptoms of depression	0.84	0.74	0.86	0.78	0.84	0.71	0.69***	0.65**	0.73**	0.69**	0.73**	0.67**	0.81*	0.68**	0.80*	0.68**	0.80*	0.61***
QI5	Depression without antidepressant therapy	1.08	1.05	1.19	1.22	1.24	1.20	0.73*	0.57**	0.81	0.67*	0.89	0.74	0.70**	0.58***	0.70**	0.62**	0.73*	0.62**
QI6	Use of 9 or more different medications	1.12	0.89	1.01	0.65**	0.92	0.51***	0.98	1.09	0.88	0.86	0.83	0.70**	0.89	0.91	1.11	0.92	1.08	0.86
QI7	Incidence of new diagnosis of cognitive impairment	0.93	0.31*	1.08	0.26*	1.04	0.25*	1.23	0.98	1.54	1.19	1.13	0.93	1.23	0.91	1.30	0.85	1.30	1.01
QI8	Prevalence of bladder or bowel incontinence	0.76***	0.76*	0.76*	0.70*	0.79	0.73	0.77**	0.73**	0.93	0.82	1.06	0.81	0.81**	0.80*	0.80*	0.71**	0.86	0.75*
QI9	Occasional incontinence without toileting plan	1.33*	1.20			1.21	1.05	1.33**	1.32*			1.21	1.19	1.11	0.91			1.01	0.79
QI10	Prevalence of indwelling catheters	1.16	1.21	1.19	1.24	1.00	0.76	1.33	1.26	1.30	1.21	1.29	1.03	1.29	1.31	1.31	1.31	1.48	1.28
QI11	Prevalence of fecal impaction	0.93	1.43	1.23	3.85	2.46	5.84	0.34	0.54	0.40	0.90	0.42	0.62	2.09	1.20	1.43	0.86	2.09	0.97
QI12	Prevalence of urinary tract infections	1.59**	1.52	1.56*	1.53	1.41	1.09	1.28	1.57*	1.35	1.51*	1.33	1.29	0.96	1.07	1.03	1.05	0.99	0.93
QI13	Prevalence of weight loss	1.37*	1.22	1.46*	1.60*	1.39	1.28	0.91	0.95	0.99	0.94	0.92	0.66*	1.17	1.20	1.26	1.26	1.25	1.05
QI14	Prevalence of tube feeding	1.39	0.77	1.25	0.61	1.13	0.56	0.83	0.73	0.85	0.68	0.72	0.73	1.18	0.88	1.21	0.83	1.04	0.78
QI15	Prevalence of dehydration	1.06	1.23	0.85	1.71	0.74	1.83	0.70	0.88	1.02	0.92	1.73	1.02	1.42	0.66	0.98	0.73	1.22	0.70
QI16	Prevalence of bedfast residents	1.24	0.84	0.92	0.93	0.72	1.01	0.91	0.21*	0.89	0.22*	0.83	0.26	1.41	0.95	1.26	1.01	1.36	0.95
QI17	Incidence of decline in late loss ADLs	1.09	1.05	1.15	1.31	0.91	0.88	1.03	1.02	1.12	1.15	0.96	0.91	1.06	0.94	1.05	1.00	0.97	0.92
QI18	Incidence of decline in ROM	1.13	1.51*	1.20	1.66*	1.14	1.55	1.36*	1.66**	1.44*	1.80***	1.42*	1.60*	1.23	1.40*	1.29	1.44*	1.30	1.45*
QI19	Antipsychotic use w/no psychotic related conditions	0.89	1.13			0.83	0.95	1.00	0.91			0.99	0.97	1.11	0.76*			1.07	0.79
QI20	Prevalence of anti-anxiety / hypnotic use	1.31*	1.64**	1.39*	1.80***	1.39*	1.78**	0.94	1.14	0.96	1.12	0.93	1.05	0.92	1.01	0.92	0.95	0.96	0.98
QI21	Hypnotic use more than 2 times in the last week	2.05*	2.07	1.94	2.11	2.07	2.56	0.82	0.81	0.73	0.61	0.71	0.68	1.33	1.71	1.38	1.53	1.36	1.48
QI22	Daily physical restraints	0.94	0.72	0.99	0.71	1.23	0.82	0.56**	0.70	0.58**	0.69	0.80	1.16	0.88	0.74	0.90	0.77	1.01	1.01
QI23	Prevalence of little or no activity	1.07	1.12			1.17	1.20	1.04	0.93			1.10	1.04	1.03	1.34**			1.04	1.35*
QI24	Prevalence of stage 1-4 pressure ulcers	1.03	1.00	1.06	2.40	1.19	2.26	0.98	1.10	0.85	1.22	0.82	1.09	0.95	0.97	0.73	0.48	0.78	0.56

- P<.05, ** P<.01, ***P<.001
- Note: Some cells are blank because no analysis was done using the minimum risk adjustment method; only the comprehensive adjustment was applied.

Basic adjustment: Age, gender, race, and baseline ADLs (Morris et al., 1999), length of stay, and difference between assessment dates; **Comprehensive adjustment:** Basic adjustment plus facilities.

Period 1: 6-9 months after enrollment; Period 2: 12 – 15 months after enrollment; and Period 3: 18 – 21 months after enrollment.

DISCUSSION

This evaluation has analyzed utilization of services, cost, and quality of care, comparing MSHO enrollees with PMAP controls. Encounter and fee-for-service claims data has been analyzed to determine the overall impact of MSHO on the type and volume of service provided to enrollees and if the provision of care coordination and the integration of long-term care with acute and primary care services has resulted in a reduced use of acute care services including inpatient hospitalization, emergency room visits and preventable hospitalizations. The cost to the government for the provision of services measured through MSHO capitation payments were compared to fee-for-service Medicare payments and Medicaid capitation payments for the control groups. Quality of care was measured in terms of mortality, change in functional status over time, delay in nursing home admission, rate of discharges from nursing homes, and quality indicators for nursing home residents.

The potential impact of MSHO centers around lowering rates or use of expensive inpatient services either in an acute care hospital setting, emergency room, or in a nursing home (long-term stays) by providing more preventive services, more community based home services as well as increased primary care and ambulatory services such as office visits provided by physicians and nurse practitioners. When hospitalizations occur, it is expected that the length of stay will decrease. Rates of short nursing home stays may increase as an alternative to longer hospital stays.

In general we did not find a significant difference in utilization of services in the community population. We did see a fairly consistent and significant difference (across services and in the same direction) in utilization for nursing home enrollees. The following summarizes the results:

Utilization Analysis
Community
- No difference in hospital admissions after adjustments
- Inpatient hospital length of stay is longer for Control-Out group with and without adjustment and longer for the Control-In group with adjustment
- MSHO enrollees have fewer preventable emergency visits than Control-In group
- MSHO enrollees have fewer number of face-to-face provider visits
- Generally the pattern of utilization when analyzing only the frail community enrollees is comparable to the larger study
- There is a greater effect on preventable emergency room visits and preventable hospitalizations compared to control groups with increased duration in MSHO. There was no effect of duration of exposure to MSHO on utilization of other services.
- MSHO enrollees more likely to receive preventive services (immunizations and most Medicare covered screening tests) Pattern is stronger compared to Control-In group
- MSHO enrollees receive more therapy services and generally fewer lab and x-ray services
- MSHO enrollees generally received fewer mental health services

- MSHO enrollees receive more home health nursing visits and special transportation but fewer other community based services such as semi residential care, out-of-home care, lower level assistance in home, respite care, and case management

Nursing Homes
- MSHO enrollees had fewer hospital admissions than Control-In enrollees
- MSHO enrollees had fewer hospital days than Control-In enrollees
- MSHO enrollees had fewer preventable hospital admissions than Control-In enrollees
- MSHO enrollees had fewer emergency room visits and preventable emergency room visits than either control group
- MSHO enrollees had fewer face-to-face provider visits than either control group
- There was no effect on utilization with increased duration or exposure to MSHO – similar results were found at less than 30 days as well as greater than one year
- MSHO enrollees were more likely to receive influenza immunization and some screening tests than either control group
- MSHO enrollees received fewer therapy services as well as lab and x-ray services

Cost Analysis
- MSHO capitation rates were significantly higher than fee-for-services payments for the Control-In group for both the community and nursing home population
- MSHO capitation rates for frail community enrollees, indicated by Rate Cell B, were significantly higher than fee-for-services payments for Control-In enrollees only in 2000.
-

Quality of Care Analysis
- There was no difference in death rates overall for either community or nursing home groups
- MSHO had significantly fewer short stay (30 days or less) nursing home admissions than either control group
- There was no difference between groups in rates of nursing home discharge (successful discharge in that the individual was alive upon discharge and for up to one month following discharge) for nursing home stays less than 30 days. MSHO had significantly greater rates of discharge at less than 60 days compared to both groups. MSHO had a significantly lower rate of discharge from nursing homes greater than 60 days
- Quality Indicators for nursing home residents were comparable for MSHO and the two control groups

In general, the results of this evaluation are mixed. Some expectations of the MSHO demonstration have been realized and some have not. The effect of MSHO is stronger for nursing home enrollees as compared to community enrollees. The results suggest that MSHO is having some impact on the process of care, providing more of some types of preventive and community care services for community residents (although the number of face-to-face provider visits is significantly less than either control group). There is no consistent measurable effect, however, on the various outcomes or indicators of quality care measured in this study for

community residents. There was indication however, that the rate of preventable emergency room use is lower for MSHO enrollees compared to the Control-In group. The pattern of results is the same when considering only the frail community elderly, a group targeted by MSHO for greater emphasis and a group for which MSHO receives a larger Medicare capitation payment.

MSHO nursing home enrollees have significantly fewer hospitalizations, emergency room services, and preventable emergency services than either control group. Hospital days and preventable hospital admissions are also significantly lower for MSHO nursing home enrollees compared to the Control-In group. The reduced number of hospital days appears to be as a result of fewer admissions, not shorter lengths of stay. At the same time MSHO enrollees receive more screening tests but fewer physical therapy services, lab and x-ray services, and face-to-face provider visits. The effect of MSHO on hospital admissions and emergency room services may reflect the extensive use of a nurse practitioner model for primary care. Results found in this evaluation are consistent with other studies examining the use of nurse practitioners in nursing homes. It is impossible to determine the impact of other MSHO components such as combining Medicare and Medicaid benefits on the utilization of services by nursing home enrollees.

There is a greater effect on preventable emergency room visits and preventable hospitalizations with increased exposure to MSHO for community residents. There was no change in patterns of utilization with increased exposure to MSHO for nursing home residents. In terms of quality of care, MSHO again has a mixed impact. There is no difference in the overall death rates compared to control groups for either community or nursing home residents. Contrary to expectations, MSHO has fewer short stay nursing home admissions, the same rate of longer-term nursing home admissions, a greater rate of discharge of admissions between 30 and 60 days, but lower rates of discharge for nursing home admissions greater than 60 days. Quality Indicators in nursing homes are comparable but not better than for control groups. Strong reductions in preventable hospital admission and emergency services may be part of a larger trend in overall hospital use. It is difficult to determine if the evaluation is measuring an overall phenomenon versus a specific phenomenon (i.e. cutting back on overall utilization of services in MSHO).

The cost to the government, both state and federal, is higher under MSHO compared to fee-for-service Medicare and a combination of capitated Medicaid and fee-for-service Medicaid payments. It is important to note that MSHO Medicare capitation payments are based upon a rate structure approved by CMS using the established M+C payment rates. For Medicare cost comparisons, only the frail nursing home certifiable population (rate cell B) resulted in added per capita payments to MSHO plans. For this subgroup of the community residents, MSHO Medicare costs were higher only in the last year included in this analysis. For all other populations, including those in the nursing home, MSHO plans received the same amount as they would have in the M+C program absent the demonstration. A portion of the difference in Medicare costs between MSHO enrollees and Control-In group beneficiaries in the Medicare fee-for-service program is attributable to payment policy changes enacted in the Balanced Budget Act of 1997. This legislation broke the link between local Medicare fee-for-service costs and capitation payments to managed care plans.(Medicare Payment Advisory Commission, 2001).

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Notes and Cautions
Encounter Data
January 20, 1999

These are data "caveats" that are intended to document irregularities of which any user of encounter data should be aware. The following irregularities are found across all plans. By acknowledging these irregularities, analysis of the encounter data will be more meaningful.

Encounter data has been structured to look like claims in the Fee for Service (FFS) environment. However, it is important to note that these are NOT claims. The encounter data is similar in some respects, but is different both in content and in purpose. Whereas FFS claims are submitted primarily as a mechanism by which medical providers were paid for services, encounter data is submitted as a means by which we can measure pre-paid medical activity.

Encounter data is submitted to DHS by way of the claims system. However, many of the criteria used to scrutinize FFS claims are turned off when encounter data is funneled through the claims adjudication process.

Edits:

1. **Dental Tooth Numbers/Surfaces:** Dental data submitted on behalf of the plans by Delta Dental prior to 1996 did not include tooth numbers, nor tooth surface. This caused many dental encounters to be denied because they looked like duplicate services.

2. **DHS Policy:** Edits that enforce DHS policy with regard to medical care are not all enforced within the encounter data submission process. Units of service and time claim policy guidelines are not edited for encounter data.

   Another example; In the FFS environment, providers are required to submit "Mom/Baby" maternity charges as separate claims. In the managed care environment, this policy is not enforced. For this reason, we have a mixture of procedures being followed by the plans. Analysis of maternity data, therefore, is more complex.

3. **Service Date Spans:** Encounter data is not edited to ensure that only one month of service is submitted per claim. This is standard DHS policy in the FFS environment.

4. **Duplicate Edits:** Encounter data is edited for complete duplicate services only, not for suspected or partial duplicates (as is the case in FFS).

5. **Attachments:** Encounter data is not edited for attachments, such as medical necessity forms, etc.

6. **Timely Filing:** Encounter data is not edited to ensure that the service date is within a reasonable length of time prior to date of submission. In the FFS environment, claims must be submitted within a reasonable period of time in order to be eligible for reimbursement. Especially in 1994 through 1996, encounter data may have been submitted well after the service was rendered. Encounter data is still being received in 1999 for services rendered in 1994, 1995, 1996, 1997, and 1998.

7. **Most Specific Diagnosis:** DHS does not edit encounter data to ensure that the most specific diagnosis was submitted on the encounter record. (DHS does edit to ensure that a valid diagnosis was submitted).

8. **Place/Procedure Conflict:** Encounter data is not edited for conflict between the Place of Service code and Procedure Code.

9. **Claim Types:** DHS FFS claim submission policies that require certain services to be submitted via defined claim types are not enforced in the managed care environment. Therefore, when analyzing encounter data, it cannot be assumed that the FFS claim type structure holds true within encounter data.

10. **"Paid"/"Denied":** The words "paid" and "denied" or "accepted" and "rejected" do not have precisely the same meanings in the FFS system as in the managed care system. In FFS, claims are paid and denied within a very rigorous and lengthy list of edits. If a claim is denied in the FFS environment, payment is also denied to the submitting provider. (FFS claims that were denied by edit are not included in the Encounter Model.)

    In the managed care environment, a less extensive set of edits is applied to encounter submission, fewer DHS policies are enforced (such as claim submission procedures, medical policy provisions and service pricing restrictions). In addition, as long as 90% of the batch of encounter submissions pass the edit tests, 100% of the batch is accepted and no "claim payments" are made or withheld based on the edit tests. (All encounters that pass edit tests are included in the Encounter Model, along with some that did not pass edit tests depending on the edit applied.)

11. **Rejection Rates:** Most encounter claim batches submitted by health plans contain claims that fail edits. Failure rates tend to range from 5 to 15% for 1995 data, but can be higher or lower. They vary by plan, report period (quarter), and by claim type.

    When comparisons are made between managed care results and FFS results, a tacit assumption is made in the Encounter Model that FFS rejection rates always equal 0. In other words, the Model presumes that any rejected claim (service activity) has been resubmitted and accepted for payment, and therefore has been included in the Model. This means that the encounter claim rejection rates are significant, because they produce results for managed care that under-count true service activity. If FFS rejections rates were significant (i.e., > 0), then the managed care rates would have to be adjusted for the FFS rates before comparisons could be made.

Submission:

1. **Replacement Claims:** Replacement claim processes (that exist in the FFS environment to ensure that providers could send in corrected claims) will not exist for the plans and their encounter data for services rendered prior to 1-1-1999. The impact of this is that the general quality of encounter data may be less reliable than FFS in general.

2. **Denied Claims:** Denial rates of encounter data submitted that did not pass edit tests vary widely up until 1996. A 90% minimum acceptance rate was implemented in 1996. This is important because it can cause submission rates to look very low compared to FFS claim receipts when looking at accepted claims.

3. **Encounters for Capitated Providers & Subcontractors:** It has been observed that plans have been more successful gathering encounter data from providers and subcontractors when their internal payment arrangement is not pre-paid capitation. Providers that submit "claims" to the plans as a method of getting paid are, logically, more motivated to submit encounter data (as claims). Providers where pre-paid capitation payments are made place less urgency on the process of submitting encounter data to the plan. This may mean that encounter data from pre-paid (capitated) providers is not proportionately represented, compared to providers where claims are submitted for payment.

Database:

1. **Pseudo-Provider Numbers:** Provider numbers prior to 1996 were not available from the plans. Pseudo provider ID's were assigned causing difficulty analyzing managed care activity with regard to anything related to the provider of service.

2. **Prior Authorizations:** Prior Authorization (PA) data is not required (and probably not submitted) in managed care as it is in the FFS environment.

3. **Medicare Recipient Identification:** The plans do not identify Medicare recipients in their submitted encounter data and do not (currently) provide Medicare payment information.

4. **Submitted Charges:** Some plans are submitting dollar amounts for "submitted charges" on their encounter data. These values before service dates of 1999 should never be used. For the most part, these amounts are either default amounts or false amounts. Starting in 1999, accurate submitted changes are required.

5. **Membership Volumes:** Care should be taken to give consideration to large changes in membership within plans across time and to wide variations in membership across plans. These variations in membership will cause large fluctuations in raw volumes of encounter data.

6. **Geographic Variations:** Geographic variations across plans may also cause variations in the nature of encounter data. MHP has primarily (if not exclusively) metropolitan membership. Other plans may have a more metro/outstate membership.

7. **County:** Plans may be reporting encounters for individuals residing within a county other than a county for which they are contracted.

8. **Provider Type:** Plans are self-reporting their "Provider Type" and the value may not be accurate (or may be a general default value). (Provider Type defines the provider as physician, hospital, dentist, etc.).

9. **Managed Care Expansion:** Due to the ever-progressing expansion of managed care activity into out-state Minnesota, the make-up of the managed care population is changing to include more rural populations

10. **Data Warehouse Models:** There are two sources within the warehouse where encounter data resides; the "Production Model" and the "Encounter Model". The Production Model has ALL encounter data ever accepted by DHS. The Encounter Model has all "paid" (passed edit tests) encounters, plus some encounters that were "denied" (failed edit tests) that were included to give the best possible picture of true encounter activity. Details regarding denied encounters included in the Encounter Model are available.

11. **Medicare Crossovers:** Encounter data differs from FFS data with regard to Medicare crossover claim types. Medicare crossover claims are explicitly defined in FFS by claim type. In the managed care environment, Medicare crossovers are (supposed to be) submitted by the plans, but are not explicitly set apart from the other claim types. The managed care crossovers would be found within the standard UB-92 and HCFA-1500 claim types.

This list is comprehensive only as far as the anomalies that have been discovered to date. We expect to find additional deviations, irregularities, and peculiarities as more analysis and testing is performed.

Inpatient Acute Care Services

The Medicare MedPAR file reports inpatient acute care events at the stay level (all claims pertaining to the same event are rolled together to represent a stay). From the MedPAR file we selected all claims that indicated a short stay. This indicator is derived from the provider number present on the first claim form.

We attempted to replicate the definition used in the MedPAR file but found that the provider number used by DHS is a unique number assigned by the State to each provider of services participating in the Medicaid program where Medicare uses a number indicating those providers certified to provide Medicare services. Therefore, from the DHS files we selected all claims where the provider type and the category of service indicated an inpatient hospital. Provider type and category of services were found to be in complete agreement with the Type of Bill, also indicating inpatient claims.

The DHS files reported acute care events at the claim level. DHS claims were grouped together to identify stays based upon the claim identification number and the service date from and service date to. We used a methodology to group claims consistent with the methods used by Medicare to create the MedPAR stays. We also attempted to distinguish between readmits (or new countable admissions) and transfers (not counted as a new admission) or subsequent claims for the same stay. A gap of zero or one day was considered a transfer and not counted as a new admission and a gap of two days or more was considered a readmission/new admission. By creating stays from the claims data, we lowered the number of admissions counted by not more than 2% of all inpatient claims.

Emergency Room Services

Emergency room services could be billed by providers and reported by health plans using an inpatient claim, outpatient claim, or physician claim. As such we used all available files to locate emergency room visits. We used revenue codes and procedure codes to identify emergency services. We intended to use place of service to restrict the events selected to those provided in an inpatient hospital setting or emergency room but found the place of service variable to be missing or coded as "other unlisted facility" in more than 70% of the DHS records. Discussions with the plans also revealed wide variation in how emergency services were coded, using both revenue center codes, standard procedure codes, and procedure codes unique to Minnesota. Therefore, our definition is broader than emergency room visits, representing more generally emergency services. We grouped claim lines or events by dates of service and counted only one service per day per person.

Preventable Hospitalizations and Emergency Services

Based upon our previous identification of acute inpatient hospital stays and emergency services, we identified those stays or visits that had a preventable primary diagnosis. Preventable diagnoses were defined as ambulatory care-sensitive conditions based on the International Classification of Diseases, Ninth Revision, Clinical Modification (ICD-9-CM) as used in work

by Billings, Anderson and Newman (Billings et al., 1996). We added accidents and poisonings for the preventable emergency services analysis.

Physician Services

Physician services were defined using procedure codes and either specialty code (Medicare) or category of service and treating provider type (DHS data). Provider types included physician and nurse practitioner, and in the case of DHS data, missing due to the large number of records with no treating provider type listed. We focused on procedures (CPT codes) including: Evaluation and Management (except in emergency room, hospital, or critical care), as well as face to face visits for radiation oncology and therapeutic, immunizations administration, biofeedback, dialysis, gastroenterology, otorhirolaryngology, cardiovascular, vascular diagnostic, pulmonary, allergy and immunology, neurology, CNS tests, chemo administration, photodynamic, and special dermatological procedures. We grouped claim lines to count one visit per person per day per provider. If the provider ID was missing we grouped all claim lines for that day. We removed claim lines that occurred during a hospitalization based upon our previous identification of inpatient hospital stays. We were not able to distinguish type of provider such as specialty type because the state DHS data utilized an identification system specific to the state Medicaid program with only some links to the federal Uniform Physician Identification Number (UPIN). It should be noted that some nurse practitioner visits provided by MSHO care systems may be under reported in the encounter data system because they are not traditional billable services.

Preventive Services

We selected those procedures identified by Medicare as a covered preventive service based upon procedure codes. Some services such as prostate cancer and glaucoma were only recently covered by Medicare, first covered in 2000 and 2002 respectively (GAO, 2002). Most preventive services have been covered since at least 1998. We also included selected procedure codes that might include the same procedure—for example, comprehensive eye exam, which "usually includes tonography." It should be noted that preventive services may be provided only as needed, in some cases only once per lifetime such as pneumococcal vaccines or on a schedule defined by Medicare coverage. This variable was treated as a binary variable, either the individual received it or not.

Therapy Services

Therapy services or visits including physical rehabilitation, occupational therapy, and speech therapy, can be billed as part of an inpatient or outpatient claim or directly by the vendor or service provider. As with physician visits, we gathered data from all available utilization files. We identified those claims with therapy services regardless of who provided them based upon revenue codes and procedure codes. We grouped claim lines and counted only one service per person per day. Less than 1.5% of claims indicated therapy visits that lasted more than one day. Therefore, we may have under counted a small number of claims. We removed from our analysis those claims that occurred during an inpatient hospital stay.

Lab and X-ray

Lab test and x-rays were identified using a combination of revenue codes and procedure codes from all available utilization files. Applicable procedure codes were selected by linking

them with BETOS (Berenson – Eggers Type of Service, a generally agreed upon meaningful grouping of services used by CMS) codes for lab test and imaging. We grouped claim lines and counted only one service per person per day. We removed from our analysis those claims that occurred during an inpatient hospital stay.

Mental Health Services

Due to data quality concerns we used a combination of four variables to define mental health services. We focused on 1) primary diagnosis including dementia and mental illness, 2) treating provider including a physician with a specialty focusing on mental health such as neurologists and psychiatrists, and non physician practitioners with a focus on mental health (includes social workers, psychologists, etc), general practice doctors, and NPs, and 3) procedure type including psychological services and evaluation and management visits. These three variables were all found in the Medicare Carrier file as well as the state DHS files. Primary diagnosis was often missing in the DHS file as well as treating provider. Therefore, we added the fourth variable of Category of Service including Mental health, Doctor Visit, or NP Visit. When combining the four variables, at least one of the four variables had to have a specific indication of mental health services. We put greater weight on procedure type than provider type again due to data concerns and missing data. There is the potential that we undercounted mental health services from the state data if a physician (provider type and category of service) provided evaluation and management service (procedure type) where they dealt with dementia or mental illness but the primary diagnosis for that claim was missing. We combined claims by person, date, and provider ID. We removed any services that took place in the hospital.

We developed categories of mental health services as follows:

Diagnosis = missing (state data only)
- Psychological services by MD
- Psychological services by non MD
- Psychological services by unknown
- Evaluation and Management by MD (note: empty because no way of identifying if mental treatment)
- Evaluation and Management by non MD (note: filled only with psychologists and clinical social workers, if plain NP can't identify as mental health related)
- Evaluation and Management by unknown

Diagnosis = dementia
- Psychological services by MD
- Psychological services by non MD
- Psychological services by unknown
- Evaluation and Management by MD
- Evaluation and Management by NON MD
- Evaluation and Management by unknown

Diagnosis = mental
- Psychological services by MD
- Psychological services by non MD

- Psychological services by unknown
- Evaluation and Management by MD
- Evaluation and Management by NON MD
- Evaluation and Management by unknown

Home Health Services

Our definition of home health services was based upon the coverage guidelines for Medicare. Data was used from the Medicare Home Health file as well as DHS files. The Medicare Home Health file contains 100% of the claims for home health services. We selected claims with a revenue center code indicating PT, OT, Speech Therapy, or Skilled Nursing or CPT codes indicating Therapy, Home Visits, or Nurse Visits. Because the state DHS files do not separate out home health services into a separate file, we added a category of service to the definition, focusing on personal care services or home health services. There was no consistent data available from the two data sources regarding the frequency or quantity of services provided, so our analysis centered on counting whether there was any indication of home health services during a month period.

Community Services

We broke the general category of community services into subcategories including: semi-residential (assisted living, foster care, and halfway houses), out of home care (adult day care and day training), lower levels (less skilled) home health care (including modifications and adaptations, behavioral program services, chore, companion services, home delivered meals, homemaker services, care giver training, supported employment services, supported living services, independent living skills, in-home family support), respite care, special transportation, case management and personal care services. These services are not covered by Medicare and Medicaid but are covered under MSHO and the Elderly Waiver for eligible PMAP clients. As a result we used data from the state DHS files only. Services were identified by the category of service. Again, frequency or quantity of services provided was not available. We counted the occurrence of the service by per person by month.

Nursing Home Stays

Nursing home days are paid for by: Medicare for up to 100 days under certain conditions, MSHO for up to the first 180 days for those community enrollees entering a nursing home, and Medicaid fee-for-service for all other remaining nursing home days. Our examination of nursing home claims produced several findings: 1) nursing home claims in Medicare MedPAR files are reported as stays whereas state claims typically began on the first of the month and ended on the last day of the month; 2) the earliest service date from did not always match the admission date; 3) there was frequently more than one admission date for one person; 4) there were a large number of cases where there was a gap in claims anywhere from less than one month to more than two years; 5) the State may or may not pay for leave days when the nursing home resident is in the hospital based upon occupancy in the nursing home; 6) the existence of claims data was not always consistent with data provided in the enrollment files including nursing home rate cell and living arrangement; and the length of stay in the nursing home can also include periods where the person was not yet dually eligible and absent from our data files. The presence or absence of nursing home claims can be impacted by dual eligibility status, acute inpatient leaves

of absence, and data errors. Based upon these issues, discussions with State DHS staff and our understating of nursing home claims processing, we developed the following procedure to identify a nursing home stay.

In general, we used claims data, identifying first service date from and last service through, for all claims from State and Medicare. By this process we grouped all continuous claims together into one stay (regardless of payment source). Where there was a gap in claims information, we applied the following rules (these rules apply regardless of whether there were multiple admission dates and whether the admission dates were the same or different):

We considered as one continuous stay all gaps:
  1) that were less than one month
  OR
  2) where the individual was NOT dually eligible for the entire gap AND the gap was less than three months
  OR
  3) where the state indicates the person was living in the nursing home during the entire gap (living arrangement is nursing home) AND there is a hospitalization that occurs during the gap.

We considered as distinct stays all remaining cases.

At the end of this process every nursing home stay would have an admission date as the earliest admission date of all merged claims and a discharge date as the latest service date to for all merged claims. This discharge date would be considered the effective discharge date for further analyses. Therefore length of stay can be computed.

In some cases we felt confident in the data available to identify a nursing home admission but were not confident enough in our understanding of the data to create a stay, thereby we were unable to identify a discharge date. For example we considered as questionable those cases where 1) the gap was longer than one month, the individual was dually eligible for the entire gap period, the individual was not shown as living in a nursing home by the state, and there is no intervening hospitalization but where the two or more admission dates were the same; or 2) the gap was longer than one month, the individual was dually eligible for the entire gap period, the individual was not shown as living in a nursing home by the state, and there is no intervening hospitalization but the gap was equal to a whole number of months; or 3) the individual was not dually eligible for the entire gap and the gap was longer than three months. In these cases we used data for calculating rates of admission but did not include them in calculating rates of discharge.

Appendix C
Adjustors Used on Comprehensive and Conservative Models
Nursing Home Quality Indicators Analysis

QI Measure	Variables Used in Both Models	Variables Used Only in Comprehensive Model
New fractures (excludes people with prior diagnosis of fracture)	• Gender • Age • Cognitive Performance Score (CPS) • Prior Walking: Walk In Room • Prior Walking: Walk in Corridor • Prior Walking: Locomotion on Unit • Prior Walking: Locomotion off Unit • Cerebrovascular accident (stroke) • Hypotension • Hemiplegia/hemiparesis • Paraplegia • Seizure disorder • Cataracts • Glaucoma • Macular degeneration • Hip fracture • Osteoporosis • Pathological bone fracture	• Nursing Home Length of Stay • Prior ADL Status: Bed Mobility • Prior ADL Status: Transfer • Prior ADL Status: Dressing • Prior ADL Status: Eating • Prior ADL Status: Toileting • Prior ADL Status: Hygiene • Prior ADL Status: Bathing • Facility
Falls	• Gender • Age • Cognitive Performance Score (CPS) • Prior ADL Status: Bed Mobility • Prior ADL Status: Transfer • Prior ADL Status: Dressing • Prior ADL Status: Eating • Prior ADL Status: Toileting • Prior ADL Status: Hygiene • Prior ADL Status: Bathing • Prior Walking: Walk In Room • Prior Walking: Walk in Corridor • Prior Walking: Locomotion on Unit • Prior Walking: Locomotion off Unit • Cerebrovascular accident (stroke) • Hypotension • Hemiplegia/hemiparesis • Paraplegia • Seizure disorder • Cataracts • Glaucoma • Macular degeneration	• Nursing Home Length of Stay • Facility

QI Measure	Variables Used in Both Models	Variables Used Only in Comprehensive Model
Behavioral symptoms affecting others	- Gender - Age - Cognitive Performance Score (CPS) - Cerebrovascular accident (stroke) - Depression - Manic depressive (bipolar disease) - Alzheimer's disease - Dementia other than Alzheimer's - Ability to make Self Understood - Ability to Understand Others	- Nursing Home Length of Stay - Facility - Current ADL Status: Bed Mobility - Current ADL Status: Transfer - Current ADL Status: Dressing - Current ADL Status: Eating - Current ADL Status: Toileting - Current ADL Status: Hygiene - Current ADL Status: Bathing - Current Walking: Locomotion on Unit
Symptoms of depression	- Gender - Age - Cognitive Performance Score (CPS) - Cerebrovascular accident (stroke) - Alzheimer's disease - Dementia other than Alzheimer's	- Nursing Home Length of Stay - Facility - Current ADL Status: Bed Mobility - Current ADL Status: Transfer - Current ADL Status: Dressing - Current ADL Status: Eating - Current ADL Status: Toileting - Current ADL Status: Hygiene - Current ADL Status: Bathing - Current Walking: Locomotion on Unit
Depression without antidepressant therapy	- Gender - Age - Cognitive Performance Score (CPS) - Cerebrovascular accident (stroke) - Alzheimer's disease - Dementia other than Alzheimer's	- Nursing Home Length of Stay - Facility - Current ADL Status: Bed Mobility - Current ADL Status: Transfer - Current ADL Status: Dressing - Current ADL Status: Eating - Current ADL Status: Toileting - Current ADL Status: Hygiene - Current ADL Status: Bathing - Current Walking: Locomotion on Unit
9 or more different medications	- Gender - Age - Current ADL Status: Bed Mobility - Cognitive Performance Score (CPS) - Count of diagnoses - Count of infections	- Nursing Home Length of Stay - Facility - Current ADL Status: Transfer - Current ADL Status: Dressing - Current ADL Status: Eating - Current ADL Status: Toileting - Current ADL Status: Hygiene - Current ADL Status: Bathing - Current Walking: Locomotion on Unit - Race/Ethnicity - High school Education
New diagnosis of cognitive impairment (Excludes people with prior diagnosis of cognitive impairment)	- Gender - Age - Cerebrovascular accident (stroke) - Dementia other than Alzheimer's - Parkinson's disease - Transient ischemic attack (TIA) - Anxiety disorder - Depression	- Nursing Home Length of Stay - Facility
Bladder or Bowel Incontinence (Excludes people with catheter, ostomy or who are comatose)	- Gender - Age - Current ADL Status: Bed Mobility - Current ADL Status: Transfer - Current Walking: Locomotion on Unit - Cognitive Performance Score (CPS)	- Nursing Home Length of Stay - Facility - Current ADL Status: Dressing - Current ADL Status: Eating - Current ADL Status: Hygiene - Current ADL Status: Bathing

QI Measure	Variables Used in Both Models	Variables Used Only in Comprehensive Model
>= Occasional Incontinence without a Toileting Plan		- Gender - Age - Nursing Home Length of Stay - Facility
Indwelling Catheters	- Gender - Age - Cerebrovascular accident (stroke) - Paraplegia - Quadriplegia	- Nursing Home Length of Stay - Facility - Current ADL Status: Bed Mobility - Current ADL Status: Transfer - Current ADL Status: Dressing - Current ADL Status: Eating - Current ADL Status: Hygiene - Current ADL Status: Bathing - Current Walking: Locomotion on Unit
Fecal Impaction	- Gender - Age - Cerebrovascular accident (stroke) - Paraplegia - Quadriplegia	- Nursing Home Length of Stay - Facility - Current ADL Status: Bed Mobility - Current ADL Status: Transfer - Current ADL Status: Dressing - Current ADL Status: Eating - Current ADL Status: Hygiene - Current ADL Status: Bathing - Current Walking: Locomotion on Unit
Urinary tract infections	- Gender - Age - Current Walking: Locomotion on Unit - Cerebrovascular accident (stroke) - Paraplegia - Quadriplegia	- Nursing Home Length of Stay - Facility - Current ADL Status: Bed Mobility - Current ADL Status: Transfer - Current ADL Status: Dressing - Current ADL Status: Eating - Current ADL Status: Toileting - Current ADL Status: Hygiene - Current ADL Status: Bathing
Weight loss	- Gender - Age - Cognitive Performance Score (CPS) - Cancer - End-stage disease, < 6 months to live	- Nursing Home Length of Stay - Facility - Current ADL Status: Bed Mobility - Current ADL Status: Transfer - Current ADL Status: Dressing - Current ADL Status: Eating - Current ADL Status: Toileting - Current ADL Status: Hygiene - Current ADL Status: Bathing - Current Walking: Locomotion on Unit - On a planned weight change program
Tube feeding	- Comatose - Cerebral vascular Accident (stroke)	- Gender - Age - Nursing Home Length of Stay - Facility - Current ADL Status: Bed Mobility - Current ADL Status: Transfer - Current ADL Status: Dressing - Current ADL Status: Toileting - Current ADL Status: Hygiene - Current ADL Status: Bathing - Current Walking: Locomotion on Unit

QI Measure	Variables Used in Both Models	Variables Used Only in Comprehensive Model
Dehydration	• Comatose • Cognitive Performance Score (CPS) • Alzheimer's disease • Pneumonia • Respiratory infection • End-stage disease, < 6 months to live	• Gender • Age • Nursing Home Length of Stay • Facility • Current ADL Status: Bed Mobility • Current ADL Status: Transfer • Current ADL Status: Dressing • Current ADL Status: Eating • Current ADL Status: Toileting • Current ADL Status: Hygiene • Current ADL Status: Bathing • Current Walking: Locomotion on Unit
Bedfast residents	• Comatose • End-stage disease, < 6 months to live	• Gender • Age • Nursing Home Length of Stay • Facility • Prior ADL Status: Bed Mobility • Prior ADL Status: Transfer • Prior ADL Status: Dressing • Prior ADL Status: Eating • Prior ADL Status: Toileting • Prior ADL Status: Hygiene • Prior ADL Status: Bathing • Prior Walking: Locomotion on Unit • Paraplegia • Quadriplegia
Decline in late loss ADLs (Excludes totally ADL dependent, comatose, and those without prior assessment with ADLs)	• Cognitive Performance Score (CPS) • Alzheimer's disease	• Gender • Age • Nursing Home Length of Stay • Facility
Decline in ROM (Exclude if maximum ROM loss on prior assessment)	• Cerebrovascular accident (stroke) • Paraplegia • Quadriplegia • Parkinson's disease • Hemiplegia/hemiparesis • Arthritis • Multiple sclerosis • Cognitive Performance Score (CPS)	• Gender • Age • Nursing Home Length of Stay • Facility • Prior ADL Status: Bed Mobility • Prior ADL Status: Transfer • Prior ADL Status: Dressing • Prior ADL Status: Eating • Prior ADL Status: Toileting • Prior ADL Status: Hygiene • Prior ADL Status: Bathing • Prior Walking: Locomotion on Unit
Antipsychotic use w/no psychotic/ related conditions (Exclude if psychotic or related condition)		• Gender • Age • Nursing Home Length of Stay • Facility • Cognitive Performance Score (CPS) • Verbally Abusive • Physically Abusive • Socially inappropriate

QI Measure	Variables Used in Both Models	Variables Used Only in Comprehensive Model
Antianxiety /hypnotic use w/no psychotic/ related conditions (Exclude if psychotic or related condition)	• Cognitive Performance Score (CPS) • Depression • Anxiety • Manic Depression	• Gender • Age • Nursing Home Length of Stay • Facility
Hypnotic use more than two times in last week	• Cognitive Performance Score (CPS) • Frequency of pain	• Gender • Age • Nursing Home Length of Stay • Facility
Daily physical restraints	• Physically abusive	• Gender • Age • Nursing Home Length of Stay • Facility • Cognitive Performance Score (CPS) • Alzheimer's disease
Little or no activity (excludes comatose)		• Gender • Age • Nursing Home Length of Stay • Facility • Quadriplegia • Bedfast all or most of the time
Stage 1- 4 pressure ulcers	• Comatose • Current ADL Status: Bed Mobility • Current ADL Status: Transfer • Other Dx: malnutrition • End-stage disease, < 6 months to live • History of resolved ulcers	• Gender • Age • Nursing Home Length of Stay • Facility • Bedfast all or most of the time • Current ADL Status: Dressing • Current ADL Status: Eating • Current ADL Status: Toileting • Current ADL Status: Hygiene • Current ADL Status: Bathing • Current Walking: Locomotion on Unit

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Appendix D
Step by Step Process Used in Creating Clean Normalized Data Tables

The first step involved creating clean normalized data tables.

1. The Person Table contains all information about the people that does not change over time. Every Person is identified by his MSHO ID and has one record with personal identifiers. All inconsistencies between personal identifiers (Date of Birth, Date of Death, Gender, Race, etc.) as well as missing data were resolved to the extent possible during the cleaning phase of data preparation (described above). This table is the only one that contains personal information. All other normalized and analytic tables use MSHO ID.

2. The Enrollment Table is organized on Person/Month basis and contains information related to classification of people that changes from month to month. Every person (MSHO ID) has multiple records. The number of records is equal to number of months of known enrollment into studied programs and location (MSHO vs. PMAP, Control-In vs. Control-Out, Community vs. Nursing home, etc.). All conflicts between various sources that indicate enrollment and location were resolved prior to organizing this table. The Enrollment Table serves as a primary tool of allocation of services to a particular group.

3. The Service Tables have two major formats: a) Person/Date and b) Person/Time Interval. These tables are derived from the raw tables that contain claim-line, claim and combination of claims (stays) information.

3a. The Person/Date Tables contain all characteristics of services that can be associated with a specific date. Service Tables of this type are easy to maintain and handle in the database environment and therefore they are preferable from analytic standpoint. In the normalized presentation every person may have many records (one record per date per service). To improve the manageability of the database we break down all tables by similar services. In most cases, the structure of Person/Date Tables naturally reflects the structure of services (outpatient visits, inpatient and nursing home admissions, diagnoses, medications, laboratory tests, etc.). In some cases the decision to use this structure was less obvious and required additional analysis. For example, we treated length of inpatient stay as a parameter of inpatient stay and attached to the date of admission. The decision to associate the entire duration of inpatient stay with the date of admission was made based on the estimation of the frequency and the error induced by this decision in cross-sectional longitudinal analysis (monthly variations of long inpatient stays). This error does not exceed one percent of the random month-to-month variation of length of inpatient stay and cannot impact the comparison of groups.

3b. The Person/Time Interval Tables contain information about services that cannot be attributed to a specific date and require two dates (start and end) to capture them properly. Linkage of these tables with enrollment tables needs to be done carefully to split a service into time intervals that are uniform from the enrollment viewpoint. Nursing home stays can be considered as an example of data that requires this structure: the length of nursing home stay in most cases exceeds one month and Person/Date presentation would create a substantial error.

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3c. Group/Month Service Tables for longitudinal cross-sectional analysis were created in the relational database environment by aggregating Person/Date Service Tables linked with Person/Month Enrollment Tables. Due to continuous "enrollment-disenrollment" process the analyzed population is not stable (i.e., the number of cases available for the analysis is changing over time.) Nevertheless, the enrollment and disenrollment processes are synchronized with the beginning of the month. Therefore a population was considered to be stable during any month and one month was selected as a unit of aggregation. All services from the Person/Date Service Tables were attached to a specific month based on the date of service and then aggregated (counted, summed, or averaged, depending on the parameter). This procedure allowed charting the dynamics of all processes (structure of the population, mortality, resource utilization) as a function of time (month number).

Technical Tools

Relational database operations were organized using SQL Server 7.0 and later SQL Server 2000. Workstations were equipped with SQL Query Analyzer and MS Access Project. Statistical analysis was implemented using Stata, SPSS 10, and SAS 8.0.

QUALITY INDICATORS FOR IMPLEMENTATION

QI Version #:   ***6.3***

MDS 2.0 Form Type: ***QUARTERLY ASSESSMENT FORM-TWO PAGE***

DOMAIN: ACCIDENTS

TITLE	DESCRIPTION	MDS 2.0 QUARTERLY VARIABLE DEFINITION	RISK ADJUSTMENT
1. Incidence of new fractures[1] 1.1A0001	**Numerator:** Residents with new fractures on most recent assessment. **Denominator:** Residents who did not have fractures on the previous assessment.	MOST RECENT ASSESSMENT: new hip fracture (J4c is checked on most recent assessment and J4c is not checked on previous assessment) OR other new fractures (J4d is checked on most recent assessment and J4d is not checked on previous assessment)	No adjustment.
2. Prevalence of falls. 1.2A0004	**Numerator:** Residents who had falls on most recent assessment. **Denominator:** All residents on most recent assessment.	MOST RECENT ASSESSMENT: Fall within past 30 days (J4a is checked).	No adjustment.

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[1] QI was modified (from the original MDS+ definition) because certain information was not available on the MDS 2.0 Quarterly. In some cases this has resulted in a change to the title of the QI.

QUALITY INDICATORS FOR IMPLEMENTATION

QI Version #: **6.3**

MDS 2.0 Form Type: **QUARTERLY ASSESSMENT FORM-TWO PAGE**

DOMAIN: BEHAVIORAL/EMOTIONAL PATTERNS

TITLE	DESCRIPTION	MDS 2.0 QUARTERLY VARIABLE DEFINITION	RISK ADJUSTMENT
3. Prevalence of behavioral symptoms affecting others. 2.1A0005	**Numerator:** Residents with behavioral symptoms affecting others on most recent assessment. **Denominator:** All residents on most recent assessment.	MOST RECENT ASSESSMENT: Behavioral symptoms affecting others: Verbally abusive (E4b-Box A >0); OR physically abusive (E4c-Box A > 0); OR socially inappropriate /disruptive behavior (E4d-Box A > 0).	Underline High Risk[1]: [Presence of Cognitive Impairment (see Glossary)] ON THE MOST RECENT ASSESSMENT. OR [Psychotic disorders (I3= ICD 9 CM 295.00-295.9; 297.00 -298.9 or I1gg schizophrenia is checked)] OR [Manic-depressive (I3=ICD 9 CM 296.00-296.9 or I1ff is checked)][2] at the MOST RECENT OR ON THE MOST RECENT **FULL** ASSESSMENT. Low Risk: All others at MOST RECENT ASSESSMENT. Note: When the most recent assessment is a Quarterly Assessment, we will "carry forward " information about psychotic disorders and manic depression from the most recent **FULL** assessment.

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[1] Risk adjustment was modified (from the original MDS+ definition) because certain information was not available on the MDS 2.0 Quarterly.

[2] Instructions relative to the completion of item I3 (ICD-9 codes) are ambiguous. Pending clarification from HCFA, we recommend that this item include all diagnoses, from the last 90 days that are related to current ADL status, cognitive status, mood and behavior status, medical treatments, nursing monitoring, or risk of death.

MDS 2.0 Form Type: **QUARTERLY ASSESSMENT FORM-TWO PAGE**

DOMAIN: BEHAVIORAL/EMOTIONAL PATTERNS

TITLE	DESCRIPTION	MDS 2.0 QUARTERLY VARIABLE DEFINITION	RISK ADJUSTMENT
4. Prevalence of symptoms of depression.[1]	**Numerator:** Residents with Symptoms of Depression on most recent assessment. **Denominator:** All residents on most recent assessment.	MOST RECENT ASSESSMENT: Symptoms of Depression: Sad mood (E2=1 or 2) and [at least 2 symptoms of functional depression]; *Symptoms of functional depression:* *Symptom 1 distress (E1a=1or2-resident made negative statements);* *Symptom 2 agitation or withdrawal (E1n =1or 2-repetitive physical movements), or (E4e-Box A = 1, 2, or 3-resists care), or (E1o=1or2-withdrawal from activity), or (E1p=1or 2-reduced social activity);* *Symptom 3 wake with unpleasant mood (E1j =1 or 2), or not awake most of the day (N1d is checked), or awake 1 period of the day or less and not comatose (N1a+N1b +N1c $\leq$1 and B1=0);* *Symptom 4 suicidal or has recurrent thoughts of death (E1g=1 or 2);* *Symptom 5 weight loss (K3a=1).*	No adjustment.
2.2A0008			

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[1] QI was modified (from the original MDS+ definition) because certain information was not available on the MDS 2.0 Quarterly. In some cases this has resulted in a change to the title of the QI.

QUALITY INDICATORS FOR IMPLEMENTATION

QI Version #: **6.3**

MDS 2.0 Form Type: **QUARTERLY ASSESSMENT FORM-TWO PAGE**

DOMAIN: BEHAVIORAL/EMOTIONAL PATTERNS

TITLE	DESCRIPTION	MDS 2.0 QUARTERLY VARIABLE DEFINITION	RISK ADJUSTMENT
5. Prevalence of symptoms of depression without antidepressant therapy.[1] 2.3A0011	**Numerator:** Residents with symptoms of depression on most recent assessment <u>and</u> no antidepressant therapy. **Denominator:** All residents on most recent assessment.	Depression: See Glossary AND No antidepressant (O4c=0)	No adjustment.

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[1] QI was modified (from the original MDS+ definition) because certain information was not available on the MDS 2.0 Quarterly. In some cases this has resulted in a change to the title of the QI.

DOMAIN: CLINICAL MANAGEMENT

TITLE	DESCRIPTION	MDS 2.0 QUARTERLY VARIABLE DEFINITION	RISK ADJUSTMENT
6. Use of 9 or more different medications.[1] 3.1A0015	**Numerator:** Residents who received 9 or more different medications on most recent assessment. **Denominator:** All residents on most recent assessment.	MOST RECENT ASSESSMENT: O1 (number of medications) $\geq$ 9.	No adjustment.

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[1] QI was modified (from the original MDS+ definition) to reflect lack of detailed drug data from Section U.

DOMAIN: COGNITIVE PATTERNS

TITLE	DESCRIPTION	MDS 2.0 QUARTERLY VARIABLE DEFINITION	RISK ADJUSTMENT
7. Incidence of cognitive impairment.[1] 4.1A0016	**Numerator:** Residents who were newly cognitively impaired on most recent assessment. **Denominator:** Residents who were not cognitively impaired on previous assessment.	MOST RECENT ASSESSMENT: Cognitively Impaired. PREVIOUS ASSESSMENT: Does not have Cognitive Impairment. For definition of Cognitive Impairment see Glossary.	No adjustment.

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[1] QI was modified (from the original MDS+ definition) because certain information was not available on the MDS 2.0 Quarterly. In some cases this has resulted in a change to the title of the QI.

QUALITY INDICATORS FOR IMPLEMENTATION
QI Version #: **6.3**
MDS 2.0 Form Type: *QUARTERLY ASSESSMENT FORM-TWO PAGE*

DOMAIN: ELIMINATION/INCONTINENCE

TITLE	DESCRIPTION	MDS 2.0 QUARTERLY VARIABLE DEFINITION	RISK ADJUSTMENT
8. Prevalence of Bladder or Bowel Incontinence. 5.1A0018	**Numerator:** Residents who were frequently incontinent or incontinent on most recent assessment. **Denominator:** All residents, except as noted in exclusion.	MOST RECENT ASSESSMENT: Bladder Incontinence (H1b=3 or 4); OR Bowel incontinence (H1a=3 or 4). EXCLUDE: Residents who are Comatose (B1=1); OR have indwelling catheter (H3d is checked); OR have an ostomy (H3i is checked) at MOST RECENT ASSESSMENT.	High Risk[1]: Severe cognitive impairment (see Glossary); OR Totally ADL dependent in mobility ADL's (G1 a, b, e-Box A self-performance = 4 in all areas) at MOST RECENT ASSESSMENT. Low Risk: All others at MOST RECENT ASSESSMENT.
9. Prevalence of occasional or frequent Bladder or Bowel Incontinence without a Toileting Plan. 5.2A0020	**Numerator:** Residents without toileting plan on most recent assessment. **Denominator:** Residents with frequent incontinence or occasionally incontinent in either bladder or bowel on most recent assessment.	MOST RECENT ASSESSMENT: No scheduled toileting plan and no bladder retraining program (Neither H3a nor H3b is checked). Occasional or frequent bladder incontinence (H1b = 2 or 3) OR Bowel incontinence (H1a = 2 or 3).	No adjustment.

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[1] Risk adjustment was modified (from the original MDS+ definition) because certain information was not available on the MDS 2.0 Quarterly.

DOMAIN: ELIMINATION/INCONTINENCE

TITLE	DESCRIPTION	MDS 2.0 QUARTERLY VARIABLE DEFINITION	RISK ADJUSTMENT
10. Prevalence of Indwelling Catheters.	**Numerator:** Indwelling catheter on most recent assessment. **Denominator:** All residents on most recent assessment. 5.3A0021	MOST RECENT ASSESSMENT: Indwelling catheter (H3d is checked).	No adjustment[1]
11. Prevalence of Fecal Impaction.	**Numerator:** Residents with fecal impaction on most recent assessment. **Denominator:** All residents on most recent assessment. 5.4A0023	MOST RECENT ASSESSMENT: Fecal impaction (H2d is checked).	No adjustment.

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[1] Risk adjustment (included in the original MDS+ definition) cannot be defined because certain information was not available on the MDS 2.0 Quarterly.

DOMAIN: INFECTION CONTROL

TITLE	DESCRIPTION	MDS 2.0 QUARTERLY VARIABLE DEFINITION	RISK ADJUSTMENT
12. Prevalence of urinary tract infections. 6.1A0024	**Numerator:** Residents with urinary tract infections on most recent assessment. **Denominator:** All residents on most recent assessment.	MOST RECENT ASSESSMENT: Urinary tract infection (I2j is checked).	No adjustment.

QUALITY INDICATORS FOR IMPLEMENTATION

QI Version #: **6.3**

MDS 2.0 Form Type: **QUARTERLY ASSESSMENT FORM-TWO PAGE**

DOMAIN: NUTRITION/EATING

TITLE	DESCRIPTION	MDS 2.0 QUARTERLY VARIABLE DEFINITION	RISK ADJUSTMENT
13. Prevalence of weight loss. 7.1A0026	**Numerator:** Proportion of residents with weight loss of 5% or more in the last 30 days or 10% or more in the last 6 months on most recent assessment. **Denominator:** All residents on most recent assessment.	MOST RECENT ASSESSMENT: Weight loss (K3a=1).	No adjustment.

Revised: 1/19/99   *MDS 2.0 Form Type:* **QUARTERLY ASSESSMENT FORM-TWO PAGE**

DOMAIN: NUTRITION/EATING

TITLE	DESCRIPTION	MDS 2.0 QUARTERLY VARIABLE DEFINITION	RISK ADJUSTMENT
14. Prevalence of tube feeding. 7.2A0027	**Numerator:** Residents with tube feeding on most recent assessment. **Denominator:** All residents on most recent assessment.	MOST RECENT ASSESSMENT: Feeding tube (K5b is checked).	No adjustment.
15. Prevalence of dehydration. 7.3A0028	**Numerator:** Residents with dehydration. **Denominator:** All residents on most recent assessment.	Dehydration - output exceeds input (J1c is checked or I3 =ICD 9 CM 276.5)[1]	No adjustment.

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[1] Instructions relative to the completion of item I3 (ICD-9 codes) are ambiguous. Pending clarification from HCFA, we recommend that this item include <u>all</u> diagnoses, from the last 90 days that are related to current ADL status, cognitive status, mood and behavior status, medical treatments, nursing monitoring, or risk of death.

DOMAIN: PHYSICAL FUNCTIONING

TITLE	DESCRIPTION	MDS 2.0 QUARTERLY VARIABLE DEFINITION	RISK ADJUSTMENT
16. Prevalence of bedfast residents. 8.1A0030	**Numerator:** Residents who are bedfast on most recent assessment. **Denominator:** All residents on most recent assessment.	MOST RECENT ASSESSMENT: Bedfast (G6a is checked).	No adjustment.

QI Glossary

Behavior problems. Defined as one or more of the following less than daily or daily: verbally abusive (E4b-Box A >0), physically abusive (E4c-Box A >0), or socially inappropriate/disruptive behavior (E4d-Box A >0).

Cognitive impairment. Any impairment in daily decision making ability (B4 >0) AND has short term memory problems (B2a=1).

Severe Cognitive Impairment. Decision making ability is severely impaired (B4=3) AND has short term memory problems (B2a=1)

DEPRESSION:

Symptoms of Depression:
Sad mood (E2=1 or 2) and [at least 2 symptoms of functional depression];

Symptoms of functional depression:

Symptom 1 distress (E1a=1or2-resident made negative statements);

Symptom 2 agitation or withdrawal (E1n =1or 2-repetitive physical movements), or (E4e-Box A = 1, 2, or 3-resists care), or (E1o=1or2-withdrawal from activity), or (E1p=1or 2-reduced social activity);

Symptom 3 wake with unpleasant mood (E1j =1 or 2), or not awake most of the day (N1d is checked), or awake 1 period of the day or less and not comatose (N1a+N1b +N1c $\leq$1 and B1=0);

Symptom 4 suicidal or has recurrent thoughts of death (E1g=1 or 2);
Symptom 5 weight loss (K3a=1)